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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R4–ES–2012–0076; 4500030113]

RIN 1018–AY08

Endangered and Threatened Wildlife and Plants; Endangered Species Status for Cape Sable Thoroughwort, Florida Semaphore Cactus, and Aboriginal Prickly-apple, and Designation of Critical Habitat for Cape Sable Thoroughwort

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the U.S. Fish and Wildlife Service, propose to list *Chromolaena frustrata* (Cape Sable thoroughwort), *Consolea corallicola* (Florida semaphore cactus), and *Harrisia aboriginum* (aboriginal prickly-apple) as an endangered species under the Endangered Species Act, and we propose to designate critical habitat for *Chromolaena*

frustrata. We have determined that designation of critical habitat is not prudent for *Consolea corallicola* and *H. aboriginum*. These are proposed regulations, and if finalized, their effect will be to add all three species to the List of Endangered or Threatened Plants and to designate critical habitat for one species under the Endangered Species Act.

DATES: We will accept comments received or postmarked on or before **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES** section, below) must be received by 11:59 p.m. Eastern Time on the closing date. We must receive requests for public hearings, in writing, at the address shown in the **FOR FURTHER INFORMATION CONTACT** section by **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: You may submit comments by one of the following methods:

(1) *Electronically:* Go to the Federal eRulemaking Portal:

<http://www.regulations.gov>. In the search box, enter Docket No. FWS–R4–ES-2012–0076, which is the docket number for this rulemaking. Then, click the Search button.

You may submit a comment by clicking on “Comment Now!” If your comments will fit in the provided comment box, please use this feature of <http://www.regulations.gov>, as it is most compatible with our comment review procedures. If you attach your comments as a separate document, our preferred file format is Microsoft Word. If you attach

multiple comments (such as form letters), our preferred format is a spreadsheet in Microsoft Excel.

(2) *By hard copy*: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R4–ES–2012–0076; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, MS 2042–PDM; Arlington, VA 22203.

We request that you send comments **only** by the methods described above. We will post all comments on <http://www.regulations.gov>. This generally means that we will post any personal information you provide us (see the **Information Requested** section below for more information).

The coordinates, or plot points, or both, from which the critical habitat maps are generated are included in the administrative record for this rulemaking and are available at <http://www.fws.gov/verobeach/>, <http://www.regulations.gov> at Docket No. FWS–R4–ES–2012–0076, and at the South Florida Ecological Services Office (see **FOR FURTHER INFORMATION CONTACT**). Any additional tools or supporting information that we have used for this rulemaking will also be available at the Fish and Wildlife Service website and Field Office set out above, and may also be included in the preamble of this proposed rule or at [http:// www.regulations.gov](http://www.regulations.gov).

FOR FURTHER INFORMATION CONTACT: Larry Williams, Field Supervisor, U.S. Fish and Wildlife Service, South Florida Ecological Services Office, 1339 20th

Street, Vero Beach, FL 32960; by telephone 772–562–3909; or by facsimile 772–562–4288. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

This document consists of: (1) A proposed rule to list *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* as an endangered species; and (2) a proposed rule to designate critical habitat for *Chromolaena frustrata*.

Executive Summary

Why we need to publish a rule. Under the Endangered Species Act (Act), a species may warrant protection through listing if it is an endangered or threatened species throughout all or a significant portion of its range. *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* are highly restricted in their ranges and the threats occur throughout their ranges; therefore, these species qualify for listing. We are proposing to list these plants as endangered species. Their protection under the Act can only be done by issuing a rule.

- *Chromolaena frustrata* has been extirpated (no longer in existence) from half of the islands where it occurred in the Florida Keys, and threats of competition from nonnative plants and habitat loss still exist in the remaining populations.
- *Consolea corallicola* has been extirpated from half of the islands where it occurred in the Florida Keys, and threats of poaching, predation by a

nonnative moth, competition from nonnative plant species, and habitat loss still exist in the remaining populations.

- *Harrisia aboriginum* has been extirpated from the northern extent of its range in Manatee County, and threats of poaching, competition from nonnative plant species, and habitat loss still exist in the remaining populations.

The basis for our action. Under the Act, a species may be determined to be an endangered or threatened species based on any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence.

We have determined that threats to *Chromolaena frustrata* include destruction, modification, or curtailment of its habitat or range; inadequate existing regulatory mechanisms; and other natural or man-made factors, including climate change (sea level rise), small populations, and competition from nonnative plant species.

We have determined that threats to *Consolea corallicola* include destruction, modification, or curtailment of its habitat or range; overuse (poaching) and predation; inadequate existing regulatory mechanisms; and other natural or man-made factors, including climate change (sea level rise), small populations, low genetic diversity, and competition from nonnative plant species.

We have determined that the threats to *Harrisia aboriginum* include destruction, modification, or curtailment of its habitat or range; overuse (poaching); inadequate

existing regulatory mechanisms; and other natural or man-made factors, including climate change (sea level rise), small populations, and competition from nonnative plant species.

This rule proposes to designate critical habitat for *Chromolaena frustrata*.

- In total, approximately 3,466 hectares (8,565 acres) are being proposed for designation as critical habitat for *C. frustrata*. The proposed critical habitat is located in Miami-Dade and Monroe Counties, Florida.
- The proposed designation includes both occupied and unoccupied critical habitat, although those areas are not differentiated in the proposed rule or on the maps. Where the unit is not occupied by *Chromolaena frustrata*, we have concluded that the area is essential for the conservation of the species because the designation would allow for the expansion of *Chromolaena frustrata*'s range and reintroduction of individuals into areas where the species previously occurred.

This rule does not propose critical habitat for *Consolea corallicola* or *Harrisia aboriginum*. We have determined that designation of critical habitat would not be prudent for either species.

- Designation would increase the likelihood and severity of illegal collection of *C. corallicola* and *H. aboriginum*, and in doing so make enforcement of take prohibitions more difficult.
- These threats outweigh the benefits of designation for the two species.

Peer review

We are seeking comments from knowledgeable individuals with scientific expertise to review our technical assumptions, analysis of the best available science, and application of that science and to provide any additional scientific information to improve this proposed rule.

Information Requested

We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial data available and be as accurate and as effective as possible. Therefore, we request comments or information from other concerned governmental agencies, Native American tribes, the scientific community, industry, or any other interested parties concerning this proposed rule. We particularly seek comments concerning:

- (1) The species' biology, range, and population trends, including:
 - (a) Habitat requirements for feeding, breeding, and sheltering;
 - (b) Genetics and taxonomy;
 - (c) Historical and current range, including distribution patterns;
 - (d) Historical and current population levels, and current and projected trends; and
 - (e) Past and ongoing conservation measures for the species, its habitat, or both.

- (2) The factors that are the basis for making a listing determination for a species under section 4(a) of the Act (16 U.S.C. 1531 *et seq.*), which are:

(a) The present or threatened destruction, modification, or curtailment of its habitat or range;

(b) Overutilization for commercial, recreational, scientific, or educational purposes;

(c) Disease or predation;

(d) The inadequacy of existing regulatory mechanisms; or

(e) Other natural or manmade factors affecting its continued existence.

(3) Biological, commercial trade, or other relevant data concerning any threats (or lack thereof) to these species and existing regulations that may be addressing those threats.

(4) Additional information concerning the historical and current status, range, distribution, and population size of these species, including the locations of any additional occurrences or populations of these species.

(5) Any information on the biological or ecological requirements of these species and ongoing conservation measures for these species and their habitats.

(6) The reasons why we should or should not designate habitat as “critical habitat” under section 4 of the Act (16 U.S.C. 1531 *et seq.*), including whether there are threats to all the species from human activity, the degree of which can be expected to

increase due to the designation, and whether that increase in threat outweighs the benefit of designation such that the designation of critical habitat is not prudent.

(7) Specific information on:

(a) The amount and distribution of *Chromolaena frustrata* habitat;

(b) What areas, that were occupied at the time of listing (or are currently occupied) and that contain features essential to the conservation of the species, should be included in the designation and why;

(c) What areas not occupied at the time of listing are essential for the conservation of the species and why.

(8) Land use designations and current or planned activities in the areas occupied by *Chromolaena frustrata* or proposed to be designated as critical habitat, and possible impacts of these activities on the species and proposed critical habitat.

(9) Information on the projected and reasonably likely impacts of climate change on *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*, and proposed critical habitat for *Chromolaena frustrata*.

(10) Probable economic, national security, or other relevant impacts that may result from designating any area that may be included in the final designation. We are particularly interested in any impacts on small entities, and the benefits of including or excluding areas from the proposed designation that are subject to these impacts.

(11) Whether our approach to designating critical habitat could be improved or modified in any way to provide for greater public participation and understanding, or to assist us in accommodating public concerns and comments.

(12) The likelihood of adverse social reactions to the designation of critical habitat and how the consequences of such reactions, if likely to occur, would relate to the conservation and regulatory benefits of the proposed critical habitat designation.

Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include.

Please note that submissions merely stating support for or opposition to the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or threatened species must be made “solely on the basis of the best scientific and commercial data available.”

You may submit your comments and materials concerning this proposed rule by one of the methods listed in the **ADDRESSES** section. We request that you send comments **only** by the methods described in the **ADDRESSES** section.

If you submit information via <http://www.regulations.gov>, your entire submission—including any personal identifying information—will be posted on the website. If your submission is made via a hardcopy that includes personal identifying

information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on <http://www.regulations.gov>. Please include sufficient information with your comments to allow us to verify any scientific or commercial information you include.

Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on <http://www.regulations.gov>, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, South Florida Ecological Services Office, Vero Beach, Florida (see **FOR FURTHER INFORMATION CONTACT**).

Previous Federal Actions

Consolea corallicola was first recognized as a candidate species (under the species' former name *Opuntia spinosissima*) on September 27, 1985 (50 FR 39526). It was removed from the candidate list from 1996 to 1998 because there was not sufficient information on the species' biological vulnerability and threats to support issuance of a proposed rule. The 1999 Candidate Notice of Review (CNOR) published in the **Federal Register** on October 25, 1999 (64 FR 57534) included *C. corallicola* (under the species' previous name *Opuntia corallicola*) as a candidate for listing under the Act. We determined that listing was warranted, but was precluded due to workloads and priorities, and we assigned a listing priority number (LPN) of 5 to the species (64 FR 57534). Candidate species are assigned LPNs based on immediacy and magnitude of threats, as

well as taxonomic status. The lower the LPN, the higher priority that species is for us to determine appropriate action using our available resources. In 2001, *C. corallicola* (under the species' previous name *Opuntia corallicola*) remained a candidate species with the LPN of 5 (66 FR 54808, October 30, 2001). In the 2002 CNOR published on June 13, 2002 (67 FR 40657), and under the name *Consolea (opuntia) corallicola*, we changed the LPN of the species from a 5 to a 2 because the threats to the species were found to be more imminent than previously known. *Consolea corallicola* retained the LPN of 2 in the 2004 CNOR published on May 4, 2004 (69 FR 24876). We published a finding for the species in the 2005 CNOR on May 11, 2005 (70 FR 24869) in response to a petition received on May 11, 2004. The species remained on the candidate list as published in the CNORs from 2006 to 2011 with the LPN of 2 (71 FR 53756, September 12, 2006; 72 FR 69034, December 6, 2007; 73 FR 75176, December 10, 2008; 74 FR 57804, November 9, 2009; 75 FR 69222, November 10, 2010; 76 FR 66370, October 26, 2011).

Chromolaena frustrata was first recognized as a candidate species in the 1999 CNOR published in the **Federal Register** on October 25, 1999 (64 FR 57534). We determined that listing was warranted, but was precluded due to workloads and priorities, and we assigned a LPN of 5 to the species (64 FR 57534). In 2001, *C. frustrata* remained on the candidate species with the LPN of 5 (66 FR 54808, October 30, 2001). In the 2002 and 2004 CNORs (67 FR 40657, June 13, 2002; 69 FR 24876, May 4, 2004) *C. frustrata* retained the LPN of 5. We published a finding for the species in the 2005 CNOR on May 11, 2005 (70 FR 24869), in response to a petition received on May 11, 2004. We also changed the LPN of *C. frustrata* from a 5 to a 2 because the threats to the

species were found to be more imminent than previously known. The species remained on the candidate list as published in the CNORs from 2006 to 2011 with the LNP of 2 (71 FR 53756, September 12, 2006; 72 FR 69034, December 6, 2007; 73 FR 75176, December 10, 2008; 74 FR 57804, November 9, 2009; 75 FR 69222, November 10, 2010; 76 FR 66370, October 26, 2011).

The Service first recognized *Harrisia aboriginum* as a candidate species in the CNOR published on September 12, 2006, and we assigned an LPN of 5 (71 FR 53756). We determined that listing was warranted, but was precluded due to workloads and priorities. *Harrisia aboriginum* retained its candidate status in 2007 (72 FR 69034, December 6, 2007) and an LPN of 5. In the CNOR published on December 10, 2008 (73 FR 75176), we changed the LPN of *H. aboriginum* from a 5 to a 2 because the threats to the species were found to be more imminent than previously known. The species remained on the candidate list as published in the CNORs from 2009 to 2011 with the LNP of 2 (74 FR 57804, November 9, 2009; 75 FR 69222, November 10, 2010; 76 FR 66370, October 26, 2011).

On May 10, 2011, the Service announced a work plan to restore biological priorities and certainty to the Service's listing process. As part of an agreement with one of the agency's most frequent plaintiffs, the Service filed a work plan with the U.S. District Court for the District of Columbia. The work plan will enable the agency to, over a period of 6 years, systematically review and address the needs of more than 250 species listed within the 2010 Candidate Notice of Review, including *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*, to determine if these species should be added to the Federal Lists of Endangered and Threatened Wildlife and Plants.

This work plan will enable the Service to again prioritize its workload based on the needs of candidate species, while also providing state wildlife agencies, stakeholders, and other partners clarity and certainty about when listing determinations will be made. On July 12, 2011, the Service reached an agreement with a second frequent plaintiff group and further strengthened the work plan, which will allow the agency to focus its resources on the species most in need of protection under the Act. These agreements were approved on September 9, 2011. The timing of this proposed listing is, in part, therefore, an outcome of the work plan.

Status Assessment for *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*

Background

It is our intent to discuss below only those topics directly relevant to the listing of *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* as endangered in this section of the proposed rule.

Chromolaena frustrata

General Biology

Chromolaena frustrata (Family: Asteraceae) is a perennial herb. Mature plants are 15 to 25 centimeters (cm) (5.9 to 9.8 inches ((in)) tall with erect stems. The leaves and stems are covered in short, fuzzy hairs. The leaves have three distinct veins, are

roughly oval or egg shaped, and have toothed edges. The blue to lavender flowers are borne in heads usually in clusters of two to six. Flowers are produced mostly in the fall, though sometimes year round (Nesom 2006, pp. 544–545).

Taxonomy, Life History, and Distribution

Chromolaena frustrata was first reported by Chapman in 1886, from the Florida Keys, who called it *Eupatorium heteroclinium* (Chapman 1889, p. 626). Early authors assigned the species to the genus *Osmia* (Small 1913, p. 147; 1933, p. 1320). In 1970, R.M. King and H.E. Robinson placed this species in the genus *Chromolaena* (King and Robinson 1970, p. 201). Some authors continued to assign the species to the genus *Eupatorium* (i.e., Long and Lakela 1971, p. 873 and Cronquist 1980, p. 185). The authors of *Vascular Plants of Florida* recognize *Chromolaena frustrata* (Wunderlin and Hansen 2008, pp. 1–2). The Integrated Taxonomic Information System (ITIS) (2012, p. 1) indicates that the taxonomic standing for *C. frustrata* (B.L. Robinson) King and H.E. Robinson is accepted. Synonyms include *Eupatorium frustratum* B.L. Robinson and *Osmia frustrata* (B.L. Robinson) Small.

Climate

The climate of south Florida where *Chromolaena frustrata* occurs is classified as tropical savanna and is characterized by distinct wet and dry seasons, a monthly mean temperature above 18 °C (64.4 °F) in every month of the year, and annual rainfall averaging 75 to 150 cm (30 to 60 in) (Gabler *et al.* 1994, p. 211). Freezes can occur in the winter months, but are very infrequent at this latitude in Florida.

Habitat

Chromolaena frustrata grows in open canopy habitats, including coastal berms and coastal rock barrens, and in semi-open to closed canopy habitats, including buttonwood forests and rockland hammocks.

Coastal berm

Coastal berms are landscape features found along low-energy coastlines in south Florida and the Florida Keys. Coastal berm is a short forest or shrub thicket found on long, narrow, storm-deposited ridges of loose sediment formed by a mixture of coarse shell fragments, pieces of coralline algae, and other coastal debris. These ridges parallel the shore and may be found on the seaward edge or landward edge of the mangroves or farther inland depending on the height of the storm surge that formed them. They range in height from 30 to 305 cm (1 to 10 feet (ft)). Structure and composition of the vegetation is variable depending on height and time since the last storm event. The most stable berms may share some tree species with rockland hammocks, but generally have a greater proportion of shrubs and herbs. Tree species may include *Bursera simaruba* (gumbo limbo), *Coccoloba uvifera* (seagrape), *Coccothrinax argentata* (silver palm), *Guapira discolor* (blolly), *Drypetes diversifolia* (milkbark), *Genipa clusiifolia* (seven year apple), and *Metopium toxiferum* (poisonwood). Characteristic tall shrub and short tree species include *Eugenia foetida* (Spanish stopper), *Ximenia americana* (hog plum), *Randia aculeata* (white indigoberry), *Pithecellobium keyense* (Florida Keys blackbead), and *Sideroxylon celastrinum* (saffron plum). Short shrubs and herbs include

Hymenocallis latifolia (perfumed spiderlily), *Capparis flexuosa* (bayleaf capertree), *Lantana involucrata* (button sage), and *Rivina humilis* (rougeplant). More seaward berms or those more recently affected by storm deposition may support a suite of plants similar to beaches, including shoreline *Sesuvium portulacastrum* (sea purslane), *Distichlis spicata* (saltgrass), and *Sporobolus virginicus* (seashore dropseed), or scattered to dense shrub thickets with *Conocarpus erectus* (buttonwood), stunted *Avicennia germinans* (black mangrove), *Rhizophora mangle* (red mangrove), *Laguncularia racemosa* (white mangrove), *Suriana maritima* (bay cedar), *Manilkara jaimiqui* (wild dilly), *Jacquinia keyensis* (joewood), and *Borrchia frutescens* (bushy seaside oxeye) (Florida Natural Areas Inventory (FNAI) 2010a, p. 1).

Coastal berms are deposited by storm waves along low-energy coasts. Their distance inland depends on the height of the storm surge. Tall berms may be the product of repeated storm deposition. Coastal berms that are deposited far enough inland and remain long-undisturbed may in time succeed to hammock. This is a structurally variable community that may appear in various stages of succession following storm disturbance, from scattered herbaceous beach colonizers to a dense stand of tall shrubs (FNAI 2010a, p. 2).

Coastal Rock Barren

Also known as Keys tidal rock barren or Keys cactus barren, coastal rock barren is confined to the Florida Keys on limestone bedrock along shores facing both Florida Bay and the Straits of Florida. Coastal rock barrens are flat rocklands with much exposed and eroded limestone, little soil or leaf litter, and a sparse cover of stunted halophytic

herbs and shrubs in tidal rock barrens (FNAI 2010b, p. 1), or a wide variety of herbs and succulents in cactus barrens (FNAI 2010c, p. 1). The amount of exposed rock varies from practically 0 to over 50 percent of the area.

In tidal rock barrens, patches of low, salt-tolerant herbaceous species include *Borrchia frutescens* and *B. arborescens* (seaside oxeye), *Sarcocornia perennis* (perennial glasswort), *Batis maritima* (saltwort), *Monanthochloe littoralis* (shoregrass), *Distichlis spicata*, *Sporobolus virginicus*, and *Fimbristylis spadicea* (marsh fimbry). *Conocarpus erectus* is the dominant woody plant and varies from stunted, sprawling, multi-stemmed shrubs to tree size. Other typical woody species are *Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa*, and *Lycium carolinianum* (christmasberry). At the transition to upland vegetation *C. erectus* may be joined by a variety of shrubs and stunted trees of inland woody species, including *Sideroxylon celastrinum*, *Gossypium hirsutum* (wild cotton), *Pithecellobium keyense*, *Suriana maritima*, *Randia aculeata*, *Manilkara jaimiqui*, *Metopium toxiferum*, *Jacquinia keyensis*, *Maytenus phyllanthoides* (Florida mayten), and *Acanthocereus tetragonus* (barbed-wire cactus) (FNAI 2010b, p. 1).

In cactus barrens, the vegetation consists of a wide variety of herbaceous and succulent species which characteristically includes cacti, agaves, and several rare herbs. Among the latter are *Evolvulus convolvuloides* (dwarf bindweed), *Cienfuegosia yucatanensis* (Yucatan flymallow), *Jacquemontia pentanthos* (skyblue clustervine), and *Indigofera mucronata* var. *keyensis* (Florida Keys indigo). These frequently occur with grasses and sedges, such as *Leptochloa dubia* (green sprangletop), *Paspalidium chapmanii* (coral panicum), and *Cyperus elegans* (royal flatsedge). Spiny species,

particularly the rare *Opuntia triacantha* (three-spined pricklypear), are characteristic but their abundance is variable. Other spiny species include *Agave decipiens* (false sisal), *Acanthocereus tetragonus*, and *Opuntia stricta* (erect pricklypear). Scattered clumps of stunted trees may be present, including *Bursera simaruba*, *Conocarpus erectus*, *Eugenia foetida*, and *Pithecellobium unguis-cati* (catclaw blackbead) (FNAI 2010c, p. 1).

Coastal rock barren occurs above the daily tidal range, but is subject to flooding by seawater during extreme tides and storm events. Salt spray from coastal winds, as well as shallow soils, may limit height growth of woody plants. Aside from bare rock substrate, discontinuous patches of thin marl soils may be present. Fires are rare to non-existent in this community (FNAI 2010b, p. 2). The natural process giving rise to cactus barrens is not known, but because they occur on sites where the thin layer of organic soil over limestone bedrock is missing, they may have formed by soil erosion following destruction of the plant cover by fire, storm, or artificial clearing (FNAI 2010c, p. 2).

At its seaward edge, coastal rock barren borders mangrove swamp or salt marshes that are regularly inundated. At its upland edge, coastal rock barrens may grade into rockland hammock or pine rockland (FNAI 2010b, p. 2; 2010c, p. 2).

Buttonwood Forest

Forests dominated by buttonwood often exist in upper tidal areas, especially where mangrove swamp transitions to rockland hammock. These buttonwood forests have canopy dominated by *Conocarpus erectus* and often have an understory dominated by *Borrchia frutescens*, *Lycium carolinianum*, and *Limonium carolinianum* (sea lavender) (FNAI 2010d, p. 4).

Temperature, salinity, tidal fluctuation, substrate, and wave energy influence the size and extent of buttonwood forests (FNAI 2010e, p. 3). Buttonwood forests often grade into salt marsh, coastal berm, rockland hammock, and coastal rock barren (FNAI 2010d, p. 5).

Rockland Hammock

Rockland hammock is a species-rich tropical hardwood forest on upland sites in areas where limestone is very near the surface and often exposed. The forest floor is largely covered by leaf litter with varying amounts of exposed limestone and has few herbaceous species. Rockland hammocks typically have larger, more mature trees in the interior, while the margins can be almost impenetrable in places with dense growth of smaller shrubs, trees, and vines. Typical canopy and subcanopy species include *Bursera simaruba*, *Lysiloma latisiliquum* (false tamarind), *Coccoloba diversifolia* (pigeon plum), *Sideroxylon foetidissimum* (false mastic), *Ficus aurea* (strangler fig), *Piscidia piscipula* (Jamaican dogwood), *Ocotea coriacea* (lancewood), *Drypetes diversifolia*, *Simarouba glauca* (paradisetree), *Sideroxylon salicifolium* (willow bustic), *Krugiodendron ferreum* (black ironwood), *Exothea paniculata* (inkwood), *Metopium toxiferum*, and *Swietenia mahagoni* (West Indies mahogany). Mature hammocks can be open beneath a tall, well-defined canopy and subcanopy. More commonly, in less mature or disturbed hammocks, dense woody vegetation of varying heights from canopy to short shrubs is often present. Species that generally make up the shrub layers within rockland hammock include several species of *Eugenia* (stoppers), *Thrinax morrisii* and *T. radiata* (thatch palms), *Amyris elemifera* (sea torchwood), *Ardisia escallonioides* (marlberry), *Psychotria*

nervosa (wild coffee), *Chrysophyllum oliviforme* (satinleaf), *Sabal palmetto* (cabbage palm), *Guaiacum sanctum* (lignum-vitae), *Ximenia americana*, *Colubrina elliptica* (soldierwood), *Pithecellobium unguis-cati* and *Pithecellobium keyense*, *Coccoloba uvifera*, and *Colubrina arborescens* (greenheart). Vines can be common and include *Toxicodendron radicans* (eastern poison ivy), *Smilax auriculata* (earleaf greenbrier), *Smilax havanensis* (Everglades greenbrier), *Parthenocissus quinquefolia* (Virginia creeper), *Hippocratea volubilis* (medicine vine), and *Morinda royoc* (redgal). The typically sparse short shrub layer may include *Zamia pumila* (coontie) and *Acanthocereus tetragonus*. Herbaceous species are occasionally present and generally sparse in coverage. Characteristic species include *Lasiacis divaricata* (smallcane), *Oplismenus hirtellus* (basketgrass), and many species of ferns (FNAI 2010e, p.1).

Rockland hammock occurs on a thin layer of highly organic soil covering limestone on high ground that does not regularly flood, but it is often dependent upon a high water table to keep humidity levels high. Rockland hammocks are frequently located near wetlands; in the Everglades they can occur on organic matter that accumulates on top of the underlying limestone; in the Keys they occur inland from tidal flats (FNAI 2010e, p.1).

Rockland hammock is susceptible to fire, frost, canopy disruption, and ground water reduction. Rockland hammock can be the advanced successional stage of pine rockland, especially in cases where rockland hammock is adjacent to pine rockland. In such cases, when fire is excluded from pine rockland for 15 to 25 years, it can succeed to rockland hammock vegetation. Historically, rockland hammocks in south Florida evolved with fire in the landscape, fire most often extinguished near the edges when it

encountered the hammock's moist microclimate and litter layer. However, rockland hammocks are susceptible to damage from fire during extreme drought or when the water table is lowered. In these cases, fire can cause tree mortality and consume the organic soil layer (FNAI 2010e, p.2).

Rockland hammocks are also sensitive to the strong winds and storm surge associated with infrequent hurricanes. Canopy damage often occurs, which causes a change in the microclimate of the hammock. Decreased relative humidity and drier soils can leave rockland hammocks more susceptible to fire. Rockland hammock can grade into glades marsh, mangrove swamp, salt marsh, coastal rock barren, pine rockland, maritime hammock, or marl prairie (FNAI 2010e, p. 2).

The sparsely vegetated edges or interior portions laid open by canopy disruption are the areas of rockland hammock that have light levels sufficient to support *Chromolaena frustrata*. However, the dynamic nature of the habitat means that areas not currently open may become open in the future as a result of canopy disruption from hurricanes, while areas currently open may develop more dense canopy over time, eventually rendering that portion of the hammock unsuitable for *C. frustrata*.

The ecological communities and substrate upon which *Chromolaena frustrata* is found differ between the mainland populations and those in the Florida Keys. The mainland populations occur only in Everglades National Park (ENP), where *C. frustrata* occurs in rockland hammocks and buttonwood forest, often occupying the transitional areas (ecotone) between these habitats and salt marsh dominated by *Conocarpus erectus* and salt-tolerant species, on marl (an unconsolidated sedimentary rock or soil consisting of clay and lime) substrate (Sadle 2008 and 2012, pers. comm.). In the Florida Keys, *C.*

frustrata occurs on coastal rock barrens, coastal berms, and rockland hammocks on exposed bare limestone rock or with a thin layer of leaf litter (Bradley and Gann 1999, p. 37). *Chromolaena frustrata* is often found in the shade of associated canopy and subcanopy plant species; these canopies buffer *C. frustrata* from full exposure to the sun (Bradley and Gann 1999, p. 37).

Historical Range

Chromolaena frustrata was historically known from Monroe County, both on the Florida mainland and the Keys, and in Miami-Dade County along Florida Bay (Bradley and Gann 1999, p. 36). In mainland Monroe County, *C. frustrata* was known from the Flamingo area to the Madeira Bay area in what is now ENP. In the Florida Keys, *C. frustrata* was known from Key Largo to Boca Grande Key (Bradley and Gann 1999, p. 36; Bradley and Gann 2004, p. 2). The species was observed historically on Big Pine Key, Boca Grande Key, Fiesta Key, Key Largo, Key West, Knight's Key, Lignumvitae Key, Long Key, Upper Matecumbe Key, and Lower Matecumbe Key (Bradley and Gann 1999, p. 36; Bradley and Gann 2004, pp. 4–7).

The common name of *Chromolaena frustrata*, Cape Sable thoroughwort, places it in a locality where it may have never occurred. Usage of this place name may have been referring to the greater Cape Sable-Flamingo area, and not specifically to Cape Sable itself. No additional specimens or verifiable reports have documented it on Cable Sable proper. Other reports of *C. frustrata* are also suspect. It was reported from "Turner's River Hammock" in Collier County and the Ten Thousand Islands area of ENP, but no

voucher specimen has ever been located for these collections (Bradley and Gann 2004, p. 7).

Current Range

In ENP, the species appears to have a distribution approaching what was reported historically. Eleven populations supporting approximately 1,500 to 2,500 plants occur in buttonwood forests and rockland hammocks from the Coastal Prairie Trail near the southern tip of Cape Sable to Madeira Bay (Sadle 2007 and 2012, pers. comm.).

In the Florida Keys, *Chromolaena frustrata* has been extirpated from half of the islands where it occurred (Bradley and Gann 2004, p. 4). It no longer occurs on Key Largo, Big Pine Key, Fiesta Key, Knight's Key, or Key West (Bradley and Gann 2004, pp. 4–6). The current range of *C. frustrata* includes a small portion of ENP, and six islands in the Florida Keys (Upper Matecumbe Key, Lower Matecumbe Key, Lignumvitae Key, Long Key, Big Munson Island, and Boca Grande Key) (Bradley and Gann 2004, pp. 3–4). Extant populations of *C. frustrata* are identified in Table 1 and discussed below.

TABLE 1. Extant populations of *Chromolaena frustrata*.

POPULATION	OWNERSHIP	SIZE Numbers of plants	HABITAT
Everglades National Park – Flamingo District	Federal–National Park Service	1634 – 2633 (Sadle 2012, pers. comm.)	buttonwood hammock
Upper Matecumbe – Choate Tract	State–Florida Department of Environmental Protection	18 (Bradley and Gann 2004, pp. 3–6)	coastal rockland hammock
Lower Matecumbe – Klopp Tract	State–Florida Department of Environmental Protection	15 (Duquesnel 2012, pers. comm.)	coastal rockland hammock
Lignumvitae Key	State–Florida Department of Environmental Protection	81 (Bradley and Gann 2004, pp. 3–6)	rockland hammock
Long Key State Park	State–Florida Department of Environmental Protection	200 (Bradley and Gann 2004, pp. 3–6)	coastal rockland hammock
Long Key– North Layton Hammock	State–Florida Department of Environmental Protection– and Private	162 (Bradley and Gann 2004, pp. 3–6)	coastal rockland hammock
Big Munson Island	Private	4,500 (Bradley and Gann 2004, pp. 3–6)	rockland hammock
Key West National Wildlife Refuge – Boca Grande Key	Federal–Fish and Wildlife Service	25 (Bradley and Gann 2004, pp. 3–6)	rockland hammock

Demographics

Little is known about the long-term demographics or population trends of *Chromolaena frustrata*. Populations may experience declines due to the effects of hurricanes and storm surges, but the species appears to be able to rebound at affected sites within a few years. For example, after Hurricane Wilma in 2005, some populations of *C. frustrata* vanished and the habitat at these sites was significantly altered due to hurricane storm surge (Duquesnel 2005, pers. comm.; Bradley 2007, pers. comm.; Maschinski 2007, pers. comm.). However, it appears that the species is returning at these locations (Bradley 2009, pers. comm.). Furthermore, canopy disturbance may also benefit the species, as it has been speculated that the large number of plants observed at Big Munson Island in 2003 was due to thinning of the hammock canopy caused by Hurricane Georges in 1998 (Bradley and Gann 2004, p. 4).

Reproductive Biology and Genetics

The reproductive biology and genetics of *Chromolaena frustrata* have not been studied (Bradley and Gann 1999, p. 37). We have no other information available regarding the ecology of the species beyond the habitat preferences and demographic trends discussed above.

Consolea corallicola

Consolea corallicola (Family: Cactaceae) is a tree-like cactus; mature plants grow 2 meters (m) (6 feet (ft)) tall with an erect main trunk, which is elliptical or oval in cross section and armed with spines. Near the top of the plant there is a dense cluster of

branches. The stem branches (pads) are green, elliptical, relatively thin, often curved, and 12 to 30 cm (5 to 12 in) long. The spines are in clusters of five to nine, 7 to 11 cm (2.8 to 4.7 in) long, needle-like, with one of the spines much longer than the others. Spines on the main stems of older plants are enlarged. The flowers are bright red and 1.3 to 1.9 cm (0.50 to 0.75 in) wide, and the fruits are yellow, egg-shaped, and 2.5 to 5.1 cm (1 to 2 in) long (Small 1930, pp. 25–26; Anderson 2001, pp. 170–171).

Taxonomy

John Kunkel Small discovered and described *Consolea corallicola* in 1930 (Small 1930, pp. 25–26). In 1971, Long and Lakela (1971, p. 626) reassigned the plants occurring in the Florida Keys to *Opuntia spinosissima* Miller, a species restricted to the Blue Hills of south coastal Jamaica. Austin *et al.* (1998, pp. 151–158) determined that the plants in Florida are morphologically distinct from *O. spinosissima* and retained them as *O. corallicola*. Genetic studies by Gordon and Kubisiak (1998, p. 209) confirmed that the Florida plants are a genetically distinct species. Recent taxonomic treatments accept the genus *Consolea* and apply the name *C. corallicola* to the Florida species (Areces-Mallea 1996, pp. 224–226; Anderson 2001, pp. 170–171; Parfitt and Gibson 2004a, pp. 92–94). Synonyms include *Opuntia corallicola* (Small) Werdermann (Parfitt and Gibson 2004, p. 94).

Climate

The climate of south Florida where *Consolea corallicola* occurs is classified as tropical savanna, as described above for *Chromolaena frustrata*.

Habitat

Consolea corallicola occurs in rockland hammocks near sea level (Small 1930, pp. 25–26; Benson 1982, p. 531) and in buttonwood forests in the transitional area between rockland hammocks and mangrove swamps (Bradley and Gann 1999, p. 77; Gann *et al.* 2002, p. 480; Higgins 2007, pers. comm.). These community types are described above for *Chromolaena frustrata*. *Consolea corallicola* occurs on sandy soils and limestone rockland soils with little organic matter (Small 1930, pp. 25–26) and seems to prefer areas where canopy cover and sun exposure are moderate (Grahl and Bradley 2005, p. 4).

Historical Range

Consolea corallicola was known historically from three islands of the Florida Keys in Monroe County (Small 1930, pp. 25–26) and one small island in Biscayne Bay in Miami-Dade County (Bradley and Woodmansee 2002, p. 810). A population on the southeast portion of Big Pine Key in the Florida Keys (Small 1921, p. 50) was extirpated by the 1960s, as a result of road building and “collecting by cactus enthusiasts” (Bradley and Gann 1999, p. 77). A population known from Key Largo in the Florida Keys was also extirpated, although the cause of its loss is unknown (Bradley and Woodmansee 2002, p. 810).

Current Range

The current range of *Consolea corallicola* includes two naturally occurring populations, one in Biscayne National Park (BNP; Miami-Dade County) and one on a small island in the Florida Keys (Monroe County) (Bradley and Gann 1999, p. 77; Bradley and Woodmansee 2002, p. 810). These naturally occurring populations account for fewer than 1,000 plants. *Consolea corallicola* was also reintroduced at several sites in the Florida Keys, and plants survive at two of these sites on State-owned lands (Stiling 2009, pers. comm.; Stiling 2010, p. 1; Duquesnel 2011a,b, pers. comm.). Both sites together represent fewer than 50 plants. A survey of other areas containing suitable habitat in BNP was undertaken in 2002 and 2003, to locate additional populations, but none were found (Bradley and Koop 2003, p. 2).

Extant populations of *Consolea corallicola* are provided in Table 2 and are discussed below.

TABLE 2. Extant populations of *Consolea corallicola*.

Population	Ownership	Size	Habitat	Trend
Biscayne National Park	Federal – National Park Service	600 (McDonough 2010a, pers. comm.)	rockland hammock	Stable
Island in Florida Keys	Private – The Nature Conservancy	9 to 11 adults, 100s of juveniles (Gun 2012, pers. comm.)	rockland hammock, rockland hammock–buttonwood forest ecotone	Declining
Island in Florida Keys (reintroduced)	State – Florida Department of Environmental Protection	40 juveniles (Duquesnel 2011a, pers. comm.)	buttonwood forest–saltmarsh ecotone, coastal rock barren	Declining
Island in Florida Keys (reintroduced)	State – Florida Fish and Wildlife Conservation Commission	7 juveniles (Stiling 2010, p.1)	Unknown	Declining

Reintroductions

Experimental plantings of *Consolea corallicola* were conducted at several sites on State and Federal conservation lands in the Florida Keys from 1996 to 2004. However, these plantings were largely unsuccessful (with most plants succumbing to *Cactoblastis* moth damage or rot), and plants currently remain at only two of these sites, one of which is inundated too frequently during high tides to be favorable for population expansion (Duquesnel 2008, 2009, 2011a,b, pers. comm.; Stiling 2007, p. 2; Stiling 2009, pers. comm.; Stiling 2010, pp. 2, 193–194).

Reproductive Biology and Genetics

Consolea corallicola flowering occurs throughout the year, but peaks in February and March (Bradley and Koop 2003, p. 2). Plants of *C. corallicola* are functionally dioecious (i.e., with male and female flowers on separate plants), but the flowers give the appearance of a species that is hermaphroditic with perfect flowers (i.e., each flower produces stamens and ovules) (Negrón-Ortiz and Strittmatter 2004, p. 22; Negrón-Ortiz 2007a, p. 3; 2007b, p. 1362).

Sexual reproduction has not been observed in *Consolea corallicola*. All documented *C. corallicola* reproduction has been vegetative (clonal), with new plants originating from pads that fall from larger plants and take root (Negrón-Ortiz 1998, p. 208). Survival rates of fallen pads in research populations are low due to rot and *Cactoblastis* moth damage (Stiling 2010, p. 193; see **Summary of Factors Affecting the Species** below). Production of seeds is rare and the few seeds that have been observed

are thought to be the product of asexual seed reproduction (agamospermy) (Negrón-Ortiz 1998, p. 211). Two hypotheses have been suggested to explain the lack of seed production of *C. corallicola*. The first hypothesis is that the species is a sterile polyploid (abnormal cell division that results in more than two sets of chromosomes) (Negrón-Ortiz 1998, p. 212). An alternative hypothesis is the dioecious breeding system of *C. corallicola*. All plants in the known populations produce only male flowers, and no female individuals have ever been located. As a result, all existing occurrences of *C. corallicola* appear to be incapable of sexual reproduction at this time (Negrón-Ortiz and Strittmatter 2004, p. 22).

Cariaga *et al.* (2005, pp. 225–230) found no genetic diversity within the two remaining wild populations of *Consolea corallicola* and concluded that all plants within each population are likely derived clonally from a single parent plant. These data support asexual propagation as the reproductive strategy of *C. corallicola*. However, there is a small amount of variation between the two remaining wild populations, suggesting the possibility that they originated from different parent plants (Lewis 2007, p. 3). Likewise, Cariaga *et al.* (2005, p. 225) found that a single plant collected by George Avery in 1963 from Big Pine Key and maintained at Fairchild Tropical Botanical Gardens was a unique genotype, but Lewis (2007, pp. 6–7) found it to be identical to the plants from the other populations. Thus, *C. corallicola* has extremely limited genetic diversity, consisting of just one to three genetic lines.

Demographics

Annual monitoring has provided a perspective on the population structure and dynamics of *Consolea corallicola*. The wild population at BNP was monitored from 2002 to 2005. At the beginning of the study, the population consisted of 655 plants. At the end of the 3-year study in 2005, 594 plants were alive, and 61 had died (9 percent decline). Only 8 percent of plants produced flowers, and plants grew very slowly (about 1.2 cm (0.5 in) per year) (Grahl and Bradley 2005, pp. 4–5). From 2008 to 2010, the population was estimated to number approximately 600 individuals (McDonough 2010a, pers. comm.). Annual fluctuations in the number of plants is largely due to mortality of branches (pads) that fall from the larger plants but fail to permanently establish (McDonough 2010a, pers. comm.). Overall, the number of plants comprising this population appears to be stable (Bradley and Koop 2003, p. 2; Grahl and Bradley 2005, p. 2; McDonough 2010a, pers. comm.).

Population decline has been shown in a wild population on an island in the Florida Keys, which now consists of 9 to 11 adult plants (defined as plants greater than 91.4 cm (3 ft) tall) and hundreds of small juveniles originating from fallen pads. Overall, the number of adult plants in this population has declined more than 50 percent over the past 10 years, due to crown rot and damage caused by the *Cactoblastis* moth and hurricanes (Higgins 2007, pers. comm.; Gun 2012, pers. comm.; see **Summary of Factors Affecting the Species** below).

Harrisia aboriginum

Description

Harrisia aboriginum (Family: Cactaceae) is a sprawling cactus, usually with multiple stems arising from a single base. The stems are erect, slender, and cylindrical. They possess 9 to 11 longitudinal ribs, and may reach 6 m (20 ft) in height. Spines are 1.0 cm (0.4 in) long and originate in clusters of seven to nine spines. Flowers are funnel-shaped, white, up to 15 cm (5.9 in) long, and have a slight scent. The inside of the flower is lined with stiff, brown hairs. Fruits are yellow, round in shape, and 6.1 to 7.6 cm (2.4 to 3.0 in) in diameter (Small in Britton and Rose 1920, p. 154; Anderson 2001, p. 370; Parfitt and Gibson 2004b, p. 153). Each fruit contains hundreds of small black seeds. Plants in full to partial sun typically consist of several stems from a single base. Plants shaded by overstory vegetation usually have stems that tend to be slender and taller. These slender stems will topple over and eventually recorrect their growth upward, or they may reproduce new upright stems along the prostrate stems. Some of the prostrate stems deteriorate over time, obscuring the clonal origin (single source) of upright stems. This results in more diffuse groupings of clonal stems leaning at various angles (Bender 2011, p. 18).

Taxonomy

Harrisia aboriginum was described by John Kunkel Small, after he discovered it in Manatee County in 1919 (Small in Britton and Rose 1920, p. 154). This name is still in use (Parfitt and Gibson 2004b, p. 153; Wunderlin and Hansen 2008, pp. 1–2), although possible alternative names for the species have been proposed over the years. The genus-level placement of *H. aboriginum* and other Florida relatives has been in flux since they were first described, with some authors placing them in the large and variable genus

Cereus (i.e. Benson 1969, p. 126), and others segregating them into the smaller *Harrisia* genus. Recent authors have included the Florida species in the genus *Harrisia* (Hooten 1991, pp. 64–66; Anderson 2001, p. 370; Ward 2004, pp. 365–371; Parfitt and Gibson 2004b, pp. 150–153; Wunderlin and Hansen 2008, pp. 1–2).

Based upon the best available scientific information, *Harrisia aboriginum* is a distinct taxon, endemic to the west coast of Florida. Synonyms include *Cereus aboriginum* (Small ex Britton and Rose) Little, *C. gracilis* var. *aboriginus* (Small ex Britton and Rose) L. D. Benson, and *Harrisia donae-antoniae* Hooten (Parfitt and Gibson 2004b, p. 153).

Climate

The climate of south Florida where *Harrisia aboriginum* occurs is classified as tropical savanna as described above for *Chromolaena frustrata*.

Habitat

Harrisia aboriginum occurs on coastal berms, coastal strand, coastal grasslands and maritime hammocks, with a sand substrate. It also occurs on shell mounds with a calcareous shell substrate (Bradley *et al.* 2004, pp. 4, 14). The coastal berm community is described above for *Chromolaena frustrata*. *Harrisia aboriginum* growing in coastal berm habitat sometimes occur close to the mangrove zone, but never within it.

Coastal Strand

Coastal strand is an evergreen shrub community growing on stabilized coastal

dunes. It is usually the first woody plant community inland from the coast. On the southwest Gulf coast of Florida, coastal strand is patchily distributed. It usually develops as a band between dunes dominated by *Uniola paniculata* (sea oats) along the immediate coast, and maritime hammock, scrub, or mangrove swamp communities farther inland. On broad barrier islands, it may also occur as patches of shrubs within a coastal grassland matrix (FNAI 2010f, p. 2).

On the southwest Gulf coast of Florida, the species composition of coastal strand consists of tropical plant species, including *Coccoloba uvifera*, *Forestiera segregata* (Florida swampprivet), *Rapanea punctata* (myrsine), *Lantana involucrata*, *Randia aculeata*, *Chiococca alba* (snowberry), *Eugenia foetida*, *Guapira discolor*, *Zanthoxylum fagara* (wild lime), *Pithecellobium keyense*, *Chrysobalanus icaco* (coco plum), *Dalbergia ecastaphyllum* (coinvine), *Sophora tomentosa* var. *truncata* (yellow necklacepod), *Caesalpinia bonduc* (gray nicker), *Sideroxylon celastrinum*, and *Jacquinia keyensis*, (FNAI 2010f, p. 2).

Soils are deep, well-drained sands and may be somewhat alkaline, consisting of quartz sand mixed with varying proportions of shell fragments (FNAI 2010f, p. 2).

Storm waves periodically destroy dunes and the coastal strand behind them, with the resulting bare area being recolonized first by pioneer beach species and then by coastal grassland. The resulting coastal grassland is in turn invaded by patches of woody species, which eventually coalesce into a continuous woody community of coastal strand. Natural disturbances, such as strong winds and storm surge associated with hurricanes, or hard freezes, serve to open up coastal strand canopies. There is little information on natural fire frequency in coastal strand (FNAI 2010f, p. 2).

Coastal strand is distinguished from maritime hammock by the absence of distinct tree canopy and understory layers. It is distinguished from coastal berm and shell mound by its occurrence on sand deposits along a high-energy sandy coast, rather than on shell deposits along a low-energy, mangrove-dominated coast. It is distinguished from coastal grassland by the dominance of woody, rather than herbaceous, species.

Coastal Grassland

Coastal grassland is a predominantly herbaceous community occupying the drier portions of the transition zone between beach dunes on the immediate coast and communities dominated by woody species, such as coastal strand or maritime hammock, farther inland. It occurs primarily on the broader barrier islands and capes along the sandy coasts of Florida. The specialized dune building grasses of the beach dune community, *Uniola paniculata*, *Panicum amarum* (bitter panicgrass), and *Spartina patens* (saltmeadow cordgrass), are usually present, along with a variety of other herbaceous species typically found on more stable soils, such as *Andropogon* and *Schizachyrium* (bluestem grasses), *Heterotheca subaxillaris* (camphorweed), and *Smilax auriculata*. On the southwest Gulf coast, a distinctive coastal grassland community is found on the broad barrier islands such as Cayo Costa, North Captiva, and formerly Captiva and Sanibel. It consists of a short, dense sward (a portion of ground covered with grass) of *Bouteloua hirsuta* (hairy grama). Other species present include *Ernodea littoralis* (beach creeper), *Opuntia stricta*, and *Lantana depressa* var. *sanibelensis* (Gulf Coast Florida lantana) (FNAI 2010g, entire).

Coastal grassland develops either as a barrier island builds seaward, developing new dune ridges along the shore that protect the inland ridges from sand burial and salt spray, or as a beach recovers after storm overwash and a new foredune ridge builds up along the shore, protecting the overwashed area behind it from sand burial and salt spray. As time passes, absent further storms, the coastal grassland community itself will gradually be replaced by woody species to form scrub, coastal strand, or maritime hammock communities (FNAI 2010g, entire).

Fire is naturally rare and localized in this community, with water barriers and sparse fuels combining to limit its spread (FNAI 2010g, entire).

Coastal grassland is distinguished from the beach dune community by its position inland from the immediate coastline and the presence of a variety of grasses, forbs, and pioneer dune-building grasses. It differs from coastal berm in its position on a sandy coast, rather than on a storm-deposited shell ridge on a mangrove-dominated shoreline. Coastal grassland is distinguished from coastal strand and maritime hammock in being dominated by herbaceous, rather than woody, species (FNAI 2010g, entire).

Maritime Hammock

Maritime hammock is a predominantly evergreen hardwood forest growing on stabilized coastal dunes lying at varying distances from the shore. On the southwest Gulf coast of Florida, most of the barrier islands and peninsulas are long and narrow with correspondingly small, narrow areas of hammock. Maritime hammock is best developed on the few broad islands, including Caladesi, Cayo Costa, North Captiva, and the inner barrier islands at Stump Pass and Keewaydin Island (FNAI 2010h, entire).

Canopy species include *Cococarpus erectus*, *Piscidia piscipula*, *Bursera simaruba*, *Sideroxylon foetidissimum*, *Exothea paniculata*, *Eugenia axillaris* (white stopper), *Ficus aurea*, *Coccoloba uvifera*, *Eugenia foetida*, and *Pithecellobium keyense*; shrubs include *Rapanea punctata*, *Myrcianthes fragrans* (Simpson's stopper), *Ardisia escallonioides*, *Psychotria nervosa*, *Chiococca alba*, and *Randia aculeata*. Cacti and other spiny species, such as *Agave sisalana* (sisal) and *Acanthocereus tetragonus*, may also be present. The herb layer is sparse to absent (FNAI 2010h, entire).

Maritime hammock occurs on deep, well-drained, acid quartz sands, or well-drained, moderately alkaline, quartz sands mixed with shell fragments (FNAI 2010h, entire).

Due to their coastal location with water barriers on at least one, if not two sides, fire was probably naturally rare and very spotty in maritime hammock, especially on the narrower barrier islands. Maritime hammocks are principally influenced by wind-borne salt spray, storm waves, and sand burial. If storm waves destroy the protective dunes seaward of the hammock, sand can blow inland, burying the trees. In addition to physical destruction by storm waves, hammock trees are susceptible to being killed by standing salt water deposited in low areas by storm surge (FNAI 2010h, entire).

Tropical maritime hammock can be distinguished from rockland hammock by their occurrence on sand substrate, rather than limestone. They may be similar in species composition to coastal berm, being distinguished primarily by location along a high wave energy sandy coast, rather than a low-energy, mangrove-dominated coast, and the presence of a distinct canopy layer. They are very similar to shell mounds in species

composition, being distinguished by their occurrence on a natural sand deposit rather than on pure shell (FNAI 2010h, entire).

Shell Mound

Shell mounds are small hills, usually in coastal locations, composed entirely of shells (clams, oysters, whelks) discarded by generations of Native Americans. Shell mounds are found along the coast throughout Florida and range westward and northward along the coastlines of the southeastern United States. Originally, there were many such shell mounds along coastal lagoons and at the mouths of rivers, but most were destroyed for road building in the early part of the last century. A rich, calcareous soil develops on the deposited shells, which supports a diverse hardwood forest on undisturbed mounds. Several shell mounds are now surrounded by mangroves, evidence that they were built when sea level was lower than today (FNAI 2010i, entire).

The plant species composition of shell mound forests tends to be more strictly tropical than that of maritime hammocks on sandy substrates in the same region. South Florida shell mounds are often characterized by tropical tree species such as *Bursera simaruba*, *Eugenia axillaris*, *Amyris elemifera*, *Zanthoxylum fagara*, *Sideroxylon foetidissimum*, *Exothea paniculata*, *Ficus aurea*, and *Ocotea coriacea*. Characteristic shrub species include *Chiococca alba*, *Forestiera segregata*, and *Sideroxylon celastrinum*. Shell mounds may have vegetation similar to tropical or temperate types of maritime hammock, but differ in that they grow on pure shells rather than sand or sand mixed with shell fragments (FNAI 2010i, entire).

In the habitats described above, *Harrissia aboriginum* seems to prefer areas where canopy cover is open to partially closed (Fellows *et al.* 2001, p. 3; Woodmansee *et al.* 2007, p. 115). Mortality of plants growing in deep shade under fully closed canopy has been observed (Bradley *et al.* 2004, p. 11; Bender 2011, p. 5). Plants growing in open to partially closed canopy sites tend to be more robust and produce more flowers and fruits (Bender 2011, p. 17; Conrad 2012, pers. comm.).

Historical Range

Harrisia aboriginum was known historically from coastal areas of southwest Florida along the Gulf coast in Manatee, Charlotte, Sarasota, and Lee Counties. The species was documented on six keys along approximately 125 km (78 mi) of Gulf coastline. Populations reported for Delnor-Wiggins Pass State Park, San Marco Island, Fort Pierce, and ENP are considered unsubstantiated (Bradley *et al.* 2004, pp. 5–6).

Current Range

A 2004 status survey confirmed 10 extant populations along a 100-km (62-mile) stretch of coast (Bradley *et al.* 2004, p. 8), one of which has since been extirpated (Nielsen 2009, pers. comm.). The species is extirpated in the northern extent of its historic range in Manatee County (Bradley *et al.* 2004, pp. 3, 8–9). Currently 12 sites support extant populations. Plants occur on seven public and private conservation areas, four County parcels not managed for conservation, and at least three unprotected private parcels. In total, the species was represented by an estimated 300 to 500 individuals in 2007 (Woodmansee *et al.* 2007, p. 87). Besides a few anecdotal accounts, population

trends were unknown prior to 2004. Extant populations of *Harrisia aboriginum* are provided in Table 3.

TABLE 3. Extant populations of *Harrisia aboriginum*.

Population No.	Ownership	Size (No. of plants)	Trend	Habitat
1	Private conservation	5 (Woodmansee <i>et al.</i> 2007, p. 87)	declining	maritime hammock
2	Private conservation	5 (Woodmansee <i>et al.</i> 2007, p. 87)	declining	shell mound
3	Sarasota County	50–75 (Woodmansee <i>et al.</i> 2007, p. 87)	declining	coastal strand, coastal berm
4	Sarasota County	3 (Bender 2011, pp. 9–12)	unknown	spoil mound
5	Private	at least 13 (Woodmansee <i>et al.</i> 2007, p. 87)	declining	coastal strand, coastal berm
6	State – Florida Department of Environmental Protection	27 (Woodmansee <i>et al.</i> 2007, p. 87)	declining	coastal berm, shell mound
7	Private and Charlotte County	approx. 10 (Bradley <i>et al.</i> 2004, pp. 10–37)	unknown	coastal berm
8	Private Conservation	1 (Bradley <i>et al.</i> 2004, pp. 10–37)	unknown	coastal berm
9	Lee County	1 (Woodmansee <i>et al.</i> 2007, p. 87)	stable	spoil mound
10	Lee County	4 (Woodmansee <i>et al.</i> 2007, p. 87)	declining	coastal berm
11	Lee County	300–400 (Woodmansee <i>et al.</i> 2007, p. 87)	stable	coastal berm
12	Federal – Fish and Wildlife Service	100–200 (Bradley <i>et al.</i> 2004, pp. 10–37)	stable	coastal berm

Reproductive Biology and Population Genetics

There has been little research into the reproductive biology of *Harrisia aboriginum*. Flowers are produced May through September. Ripe fruits have been observed from June through October. In some populations, fruits are frequently removed from plants by unknown animals (Fellows *et al.* 2001, p. 2). Observations suggest that establishment of new plants is likely an infrequent event. Seedlings are rarely observed. Plant fragmentation has been observed, suggesting that this could be a dispersal mechanism. New clonal plants are observed to arise from small stem fragments ranging from 5.1 to 7.6 cm (2 to 3 in) in length (Bender 2011, p. 17). Establishment from plant fragments is probably more frequent than from seed (Fellows *et al.* 2001, p. 2). There have been no genetic studies of *H. aboriginum*.

Summary of Factors Affecting the Species

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations at 50 CFR part 424 set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, we may list a species based on any of the following five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination. Each of these factors as applied to these three plants is discussed below.

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Human Population Growth and Development

Destruction and modification of habitat are a threat to *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*. Terrestrial ecosystems of south Florida have been heavily impacted by humans, through widespread clearing for agricultural, residential, commercial, and infrastructure development. Extensive areas of rockland hammock, pine rockland, and other ecosystems have been lost (Solecki 2001, p. 350; Hodges and Bradley 2006, p. 6). Because of their proximity to the beach and relatively higher elevations, coastal hammocks, strands, and berms have been heavily impacted by residential and tourism development. As a result, only isolated fragments of these habitats remain (Bradley *et al.* 2004, pp. 3–4). Loss and modification of coastal habitat due to development is expected to continue and increase in the coming decades in Florida (Zwick and Carr 2006, p. 13). Species populations are more secure on public lands than on private lands, but still face the threats of habitat loss and modification through development of public facilities such as new buildings, parking lots, and other associated facilities and through recreational opportunities to support visitor services. Impacts to each of the species are discussed below.

Chromolaena frustrata

Habitat destruction and modification resulting from development are considered a major threat to *Chromolaena frustrata* throughout the species' range (Gann *et al.* 2002, p. 387). The populations on Fiesta Key, Knights Key, Key Largo, and Key West were lost due to development. Fiesta Key is completely developed as a Kampgrounds of America (KOA) campground and is devoid of native plant communities. Knights Key is almost completely developed and has no remaining suitable habitat (Bradley and Gann 2004, p. 5). Key Largo has undergone extensive disturbance and development. Although suitable coastal berm and rockland hammock habitat are still located in State and Federal conservation sites on Key Largo (Bradley and Gann 2004, p. 8), despite extensive surveys of the island *C. frustrata* has not been located (Bradley and Gann 2004, p. 5).

Two *Chromolaena frustrata* populations, including the largest population, are located on privately owned sites, which are vulnerable to further development (Bradley and Gann 2004, p. 7; Table 1). The statewide population of *C. frustrata* was estimated at fewer than 5,000 plants in 2004, but 4,500 plants (90 percent) are located at a single, privately owned, unprotected site (Bradley and Gann 2004, p. 7). The site, Big Munson Island, is owned by the Boy Scouts of America (BSA) and is utilized as a Boy Scout Camp. Scout campsites have been established along the coastal berm (Hodges and Bradley 2006, p. 10), and recreation development (campsites) and possibly recreational activities (trampling) potentially remain a threat to *C. frustrata* at this site. At this time, we do not believe that this site faces threats from residential or commercial development. However, if development pressure and BSA recreational usage increase, this largest population may face threats from habitat loss and modification.

The population on Long Key at Layton Hammock is vulnerable to commercial or residential development (Bradley and Gann 2004, pp. 3–20). In addition, development remains a threat to any suitable rock barren or rockland hammock habitat on private lands within the species' historic range. Overall, the human population in Monroe County is expected to increase from 79,589 to more than 92,287 people by 2060 (Zwick and Carr 2006, p. 21). All vacant land in the Florida Keys is projected to be developed by then, including lands not currently accessible by automobile (Zwick and Carr 2006, p. 14).

Chromolaena frustrata populations in conservation areas have been impacted and may continue to be impacted by development with increased public use. Mechanical disturbances such as trail construction in coastal berms may have exacerbated nonnative plant invasions (see Factor E discussion below) (Bradley and Gann 2004, p. 4). *C. frustrata* has been impacted by park development on State lands, and habitat modifications such as mowing and trail maintenance remain a threat (Gann *et al.* 2002, p. 391; Bradley and Gann 2004, p. 6; Hodges and Bradley 2006, p. 30).

Consolea corallicola

Destruction and modification of habitat from development throughout the species' range continue to be a threat to *Consolea corallicola*. Unoccupied suitable habitat throughout the species' former range is under intense development pressure. Development and road building were the causes of this species' original extirpation on Big Pine Key (Bradley and Gann 1999, p. 77; Bradley and Woodmansee 2002, p. 810). Residential and commercial development and roadway construction continue to occur throughout Miami-Dade County and the Florida Keys. Both remaining wild populations

are secure from habitat destruction because they are located within private and Federal conservation areas. However, at one State-owned site where a reintroduction was attempted, all of the plants were accidentally destroyed by the expansion of a trail.

Harrisia aboriginum

Destruction and modification of habitat from development throughout the species' range continue to be a threat to *Harrisia aboriginum*. The coastal habitats of this species have been heavily impacted by development over the past 50 years (Morris and Miller 1981, pp. 1–11; Bradley *et al.* 2004, p. 3). Shell mounds created by Native Americans were among the first areas colonized by early Western Europeans because of their higher elevation and were later extensively utilized for construction material, in some cases resulting in the complete destruction of the habitat. Coastal hammocks, strands, and berms, because of their proximity to the beach and higher elevations, were also used for coastal residential construction. Only isolated fragments of suitable habitat for *H. aboriginum* remain (Bradley *et al.* 2004, p. 3).

The species was extirpated from the northern extent of its range in Manatee County by the 1970s, due to urbanization (Morris and Miller 1981, p. 2; Austin 1984, p. 69). Despite the recent downturn in residential construction, coastal development is ongoing in the habitat of *H. aboriginum*. Populations on private land or non-conservation public land are most vulnerable to habitat loss. Threats include residential development, road widening, and landscape maintenance (Morris and Miller 1981, pp. 2–11; Bradley *et al.* 2004, pp. 36–37). Suitable habitat within the species' range was recently destroyed by encroachment from a private development onto State land (FNAI 2011a, pp. 207–208).

The threats of habitat loss, modification, and degradation are expected to increase with increased human population, development pressure, and infrastructure needs. Sarasota, Charlotte, and Lee Counties, where this plant currently occurs, are expected to build out before 2060 (Zwick and Carr 2006, p. 13), placing further pressure on remaining natural areas.

Populations located on public lands are better protected than those on private land, but still may face the threat of habitat loss through development of park facilities such as new buildings, parking lots, and trails (Morris and Miller 1981, p. 4). Construction of new bathrooms in 2011 at a site owned by Sarasota County eliminated a portion of the coastal berm habitat, and parking lot renovations are planned for 2012 at a second County site where *Harrisia aboriginum* occurs (Bender 2011, p.11). Not all land managers are aware of the presence of *H. aboriginum* at sites under their jurisdiction; for example, managers at one site in Charlotte County were unaware of *H. aboriginum* on county lands (Bender 2011, p.13). Nevertheless, the population has persisted, probably due to its anonymity and difficulty of access. The lack of management, however, has allowed a heavy infestation of nonnative plants, which have modified the habitat and are shading out *H. aboriginum* (Bender 2011, p. 13). Portions of at least two populations located on public land also extend onto adjacent unprotected, private lands (Bradley *et al.* 2004, pp. 16, 36).

Populations on privately owned conservation sites may have inadequate protection from habitat loss or modification as well. One such site that was declared a “Preserve” in 1992 as part of a residential community has no formal protection; it was partially bulldozed and landscaped with native species within the past 10 years (Bradley

et al. 2004, p. 10). The number of plants observed at this “Preserve” site decreased from 226 plants in 1981 (Morris and Miller 1981, p. 5), to 5 plants in 2006 (Woodmansee *et al.* 2007, p. 87). Another site is owned by a nonprofit organization and managed for historical preservation. The site is severely disturbed from a long history of human activity and is currently open to public visitation (Woodmansee *et al.* 2007, p. 103). This population has declined over the past 30 years from 21 stems comprising 7 plants in 1981 (Morris and Miller 1981, p. 4), to only 3 plants in 2003 (Bradley *et al.* 2004, p. 13). Development of the site for public visitation likely played a role in the decline (Morris and Miller 1981, p. 4).

Other Conservation Efforts

The National Wildlife Refuge System Improvement Act of 1997 and the Fish and Wildlife Service Manual (601 FW 3, 602 FW 3) require maintaining biological integrity and diversity, comprehensive conservation planning for each refuge, and set standards to ensure that all uses of refuges are compatible with their purposes and the Refuge System’s wildlife conservation mission. The comprehensive conservation plans (CCP) address conservation of fish, wildlife, and plant resources and their related habitats, while providing opportunities for compatible wildlife-dependent recreation uses. An overriding consideration reflected in these plans is that fish and wildlife conservation has first priority in refuge management, and that public use be allowed and encouraged as long as it is compatible with, or does not detract from, the Refuge System mission and refuge purpose(s).

The CCP for the Lower Florida Keys National Wildlife Refuges (National Key Deer Refuge, Key West National Wildlife Refuge, and Great White Heron National Wildlife Refuge) provides a description of the environment and priority resource issues that were considered in developing the objectives and strategies that guide management over the next 15 years. The CCP promotes the enhancement of wildlife populations by maintaining and enhancing a diversity and abundance of habitats for native plants and animals, especially imperiled species that are only found in the Florida Keys. The CCP also provides for obtaining baseline data and monitoring indicator species to detect changes in ecosystem diversity and integrity related to climate change. In the Lower Key Refuges CCP management objective no. 16 provides specifically for maintaining and expanding populations of candidate plant species including *Chromolaena frustrata* and *Consolea corallicola*.

Special Use Permits (SUPs) are also issued by the Refuges as authorized by the National Wildlife Refuge System Administration Act (16 U.S. C. 668dd-ee) as amended, and the Refuge Recreation Act (16 U.S. C. 460k-460k-4). The SUPs cover commercial activities (such as guiding hunters, anglers or other outdoor users, commercial filming, agriculture, cabins, and trapping); research and monitoring by students, universities, or other non-Service organizations; and general use (woodcutting, miscellaneous events (fishing tournaments, one-time events, other special events), cabins/subsistence cabins, education activity). The Service has no information concerning the effects of the issuance of SUPs for any of the three species.

Summary of Factor A

In summary, the decline of *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* habitat is the result of threats that have operated in the past, are impacting these species now, and will continue to impact these species in the future. It is reasonable to conclude that the changes in the habitats historically and currently occupied by the species are the cause of observed population-level declines. The decline of these species is primarily the result of the long-lasting effects of habitat loss, degradation, and modification from human population growth and associated development. Thus, we believe these changes in the species' historic or current range will not be ameliorated in the future; therefore, we find it reasonably likely that the effects on the species will continue at current levels or potentially increase.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Overutilization (collection by hobbyists, also known as poaching) is a major threat to *Consolea corallicola* (Gann *et al.* 2002, p. 440) and *Harrisia aboriginum* (Austin *et al.* 1980, p. 2; Morris and Miller 1981, pp. 1–11; Gann *et al.* 2002, p. 481; Bradley *et al.* 2004, p. 6; Bender 2011, p. 5). Cactus poaching is an international phenomenon. Cacti are frequently impacted at sites that are known and easily accessed by poachers (Anderson 2001, pp. 73–78). The rarity of *C. corallicola* and *H. aboriginum*, coupled with their showy flowers, make these cacti particularly desirable to collectors. Seeds of *H. aboriginum* and *H. fragrans* (the fragrant prickly-apple, a federally listed endangered cactus (listed as *Cereus eriophorus* var. *fragrans*) from

Florida's east coast) are currently offered for sale by online plant distributors, demonstrating that a demand exists for these cacti from collectors. The severity of the threat of poaching is exacerbated by the fact that some populations of these cacti are limited to just a few individual plants. These smaller populations could easily be extirpated by a single poaching episode.

Consolea corallicola

Collecting by cactus hobbyists is suspected to have played a part in the extirpation of *Consolea corallicola* from Big Pine Key and Key Largo in the late 1970s, and poaching remains a major threat to this species (Gann *et al.* 2002, p. 481). Other species of *Consolea* are currently offered for sale by online plant distributors. Probable evidence of poaching activity was observed at a site in Monroe County on multiple occasions, and caused the death of one *C. corallicola* plant (Slapcinsky *et al.* 2006, p. 3). Although the remaining populations are somewhat protected due to their location on conservation lands, these plants remain vulnerable to illegal collection because the sites are remote and not patrolled regularly by enforcement personnel.

Collection for scientific and recovery purposes has so far relied on the harvesting of cuttings from plants growing in botanical garden and private collections. We expect that collection for the purposes of recovery will continue and ultimately be beneficial in augmenting and reintroducing *C. corallicola* at suitable sites. We have no evidence that collection for scientific or recovery purposes is a threat to the species at this time.

Harrisia aboriginum

Poaching of *Harrisia aboriginum* is a major threat (Morris and Miller 1981, pp. 1–11; Gann *et al.* 2002, p. 440; Bradley *et al.* 2004, p. 6). Damage and evidence of *H. aboriginum* poaching was reported by Morris and Miller (1981, pp. 1–11) at several sites. Evidence of poaching was recently observed at a site in Sarasota County that has high public visitation. At that site, there was evidence that cuttings had been removed from multiple *H. aboriginum* plants at numerous different times (Bender 2011, pp. 5–6).

Chromolaena frustrata

We have no evidence suggesting that overutilization for commercial, recreational, scientific, or educational purposes are a threat to *Chromolaena frustrata*. Except for its rarity, the species does not possess any attributes that would make it desirable to collectors, such as showy foliage or flowers, and there are no known medicinal, culinary, or religious uses for this species.

Summary of Factor B

In summary, based on our analysis of the best available scientific and commercial information we find that collecting for commercial or scientific reasons or recreational activities is not a threat to *Chromolaena frustrata* in any portion of its range at this time and is not likely to become so in the future.

We find that overutilization by poachers is a major threat to *Consolea corallicola* and *Harrisia aboriginum*. There is a current market for these cacti and evidence of ongoing collecting activity such that it is reasonable to conclude that collecting has caused declines and extirpation of populations. All populations of *C. corallicola* and *H.*

aboriginum are vulnerable to this ongoing threat; however, populations at sites that are easily accessible to the public likely face the greatest threat from collectors. The small number of remaining plants at most sites exacerbates this threat; smaller populations could be completely lost to a single collection episode. The areas that support these cacti are somewhat remote, making enforcement extremely difficult. These threats have operated in the past, are impacting these species now, and are expected to continue into the future. Based on our analysis of the best available information, we find that overutilization is a threat to these species throughout their entire range. We believe that overutilization will not be ameliorated in the future; therefore, we find it reasonably likely that the effects on the species will continue at current levels or potentially increase.

C. Disease or Predation

Chromolaena frustrata

On Big Munson Island, much of the *Chromolaena frustrata* population was observed to suffer from severe herbivory in 2004. No insects were observed on any plants, and the endangered Key deer (*Odocoileus virginianus clavium*) was the suspected culprit (Bradley and Gann 2004, p. 4). The significance of herbivory on *C. frustrata* population dynamics is unknown. No diseases have been reported for *C. frustrata*.

Consolea corallicola

A fungal pathogen, *Fusarium oxysporum*, can infect *Consolea corallicola*, causing crown rot, a disease in which plants rot near their base (Slapcinsky *et al.* 2006, p.

2; Stiling 2010, p. 191). Cacti in the Florida Keys populations that are affected by this disease have also tested positive for a fungus, *Phomopsis* sp. (Slapcinsky *et al.* 2006, p. 3). This disease was largely responsible for the high mortality rates in some reintroduced populations in the Florida Keys (Stiling 2010, p. 193). At present, crown rot does not appear to be affecting the population at BNP.

Predation by the moth *Cactoblastis cactorum* (Lepidoptera: Pyralidae) is considered a significant threat to *Consolea corallicola* (Stiling *et al.* 2000, pp. 2, 6; Gann *et al.* 2002, p. 481; Wright and Maschinski 2004, p. 4; Grahl and Bradley 2005, pp. 2, 7; Slapcinsky *et al.* 2006, pp. 2–4). Native to South America, *Cactoblastis cactorum* was introduced to Australia in 1925, as a biological control agent for nonnative species of *Opuntia*. Adult moths deposit eggs on the branches of host species. When these eggs hatch, larvae then burrow into the cacti and feed on the inner tissue of the plant's stems. The larvae then pupate, and the cycle repeats. *Cactoblastis cactorum* was extremely effective as a biological control agent, and credited with reclaiming 6,474,970 ha (16,000,000 ac) of land infested with *Opuntia* species in Australia alone. The moth also has been an effective control agent for *Opuntia* species in Hawaii, India, and South Africa. It was introduced to a few Caribbean islands in the 1960s and 1970s, and rapidly spread throughout the Caribbean. The effectiveness of *C. cactorum* at controlling *Opuntia* populations is described as “rapid and spectacular” (Habeck and Bennett 1990, p. 1). The moth had spread to Florida by 1989, prompting the Florida Department of Agriculture and Consumer Services (FDACS) to issue an alert that *C. cactorum*, along with another unidentified species of moth, had the potential to adversely impact *Opuntia* populations due to the high rate of *Opuntia* infestation and mortality, as demonstrated in

other localities in the Caribbean and elsewhere (Habeck and Bennett 1990, p. 1). Among local cactus species in the Florida Keys, *C. corallicola* is a preferred host (Stiling 2010, p. 190). Between 1990 and 2009, the moth infested and damaged multiple *C. corallicola* plants in the Florida Keys' wild populations, killing one plant and damaging others (Gun 2012 pers.comm.. Fortunately, these infestations were detected very early and controlled before *C. cactorum* could kill multiple plants and fully spread throughout the population. Planted *C. corallicola* populations in the Florida Keys fared much worse; at one planting site, 90 individuals (50 percent of those planted) were killed by *C. cactorum* over a 4-year period (Stiling 2010, p. 193). To date, *C. cactorum* has not been observed in BNP (McDonough 2010a, pers. comm.). Even if the moth has not yet reached the Park, it likely will, based on its rapid spread in the Caribbean and Florida. This threat has the potential to cause steep declines in populations of *Consolea corallicola* if they become infested. No satisfactory method of large-scale control is known at this time (Habeck *et al.* 2009, p. 2). Potential impacts to *C. corallicola* at the population level as a result of predation by *C. cactorum* are severe. As stated above, experts are certain of the potential for the moth to cause massive mortality in populations of *C. corallicola* if they become infested and the infestation is not caught early and aggressively controlled.

Predation by the Cuban garden snail (*Zachrysia provisoria*) has been observed at one *Consolea corallicola* reintroduction site (Duquesnel 2008, pers. comm.). The population-level impact of the Cuban garden snail is not known.

Harrisia aboriginum

An as yet unidentified pathogen can attack *Harrisia aboriginum* and cause stems to rot and die within about a week (Austin 1984, p. 2; Bradley 2005, pers. comm.). However, no signs of this disease were observed at several sites visited in 2011 (Bender 2011, p. 19).

Herbivory of flowers by iguanas (Bradley *et al.* 2004, p. 30) and stems by gopher tortoises (Woodmansee *et al.* 2007, p. 108) has been noted. Scale insects have been observed in some *H. aboriginum* populations, occasionally causing severe damage to plants (Bradley 2005, pers. comm.).

Overall, evidence indicates disease and predation are relatively minor stressors to *H. aboriginum* at present, but could become threats in the future if they become more prevalent in the cacti populations.

Summary of Factor C

In summary, *Chromolaena frustrata* does not appear to be affected by disease or predation; disease and predation have been reported occasionally for *Harrisia aboriginum*. We have no evidence that the severity of either stressor has affected either species at a population level. Though it is possible the amount of disease or predation may increase in the future, there is no evidence that this stressor is growing in extent. Thus, based on our analysis of the best available scientific and commercial data available, we find that disease or predation is not a significant stressor to the overall status of *C. frustrata* or *H. aboriginum* at current levels, though these stressors could potentially become a threat in the future if these pests become more prevalent.

Disease and predation are severe threats to *Consolea corallicola*. Threats from

disease include a pathogen that can cause crown rot and predation by the nonnative moth, *Cactoblastis cactorum*. Both are severe and pervasive threats, and it is reasonable to conclude that disease and predation have caused population declines. We have no reason to believe that diseases or predation will be ameliorated in the future; therefore, we find it reasonably likely that the effects on *C. corallicola* will continue at current levels or potentially increase in the future.

D. The Inadequacy of Existing Regulatory Mechanisms

Under this factor, we examine whether existing regulatory mechanisms are inadequate to address the threats to the species discussed under the other factors. Section 4(b)(1)(A) of the Act requires the Service to take into account “those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect such species....” In relation to Factor D, we interpret this language to require the Service to consider relevant Federal, State, and tribal laws, plans, regulations, and other such mechanisms that may minimize any of the threats we describe in threat analyses under the other four factors, or otherwise enhance conservation of the species. We give strongest weight to statutes and their implementing regulations and to management direction that stems from those laws and regulations. An example would be State governmental actions enforced under a State statute or constitution, or Federal action under statute.

State

Chromolaena frustrata, *Consolea corallicola*, and *Harrisia aboriginum* are listed on the Regulated Plant Index as endangered under Chapter 5B-40, Florida Administrative

Code. The Regulated Plant Index also includes all federally listed endangered and threatened plant species. Florida Statutes 581.185 sections (3)(a) and (b) prohibit any person from willfully destroying or harvesting any species listed as endangered or threatened on the Index, or growing such a plant on the private land of another, or on any public land, without first obtaining the written permission of the landowner and a permit from the Florida Department of Plant Industry (DPI). The statute also requires that collection permits issued for species listed under the Act must be consistent with Federal standards (i.e., only the Service can issue permits to collect plants on Federal lands). The statute further provides that any person willfully destroying or harvesting; transporting, carrying, or conveying on any public road or highway; or selling or offering for sale any plant listed in the Index must have a permit from the State at all times when engaged in any such activities. However, despite these regulations, recent poaching is evident, and threats to the three species (particularly the two cacti) remain. Lack of implementation or compliance with existing regulations may be a result of funding, work priorities, or staffing.

In addition, subsections (8)(a) and (b) of the statute waive State regulation for certain classes of activities for all species on the Regulated Plant Index, including the clearing or removal of regulated plants for agricultural, forestry, mining, construction (residential, commercial, or infrastructure), and fire-control activities by a private landowner or his or her agent. However, section (10) of the statute provides for consultation similar to section 7 of the Federal Act for listed species by requiring the Department of Transportation to notify the FDACS and the Endangered Plant Advisory Council of planned highway construction at the time bids are first advertised, to facilitate

evaluation of the project for listed plants populations, and to “provide for the appropriate disposal of such plants” (i.e., transplanting,). The Service has no information concerning the State of Florida’s implementation of the enforcement of these statutes. However, it is clear that illegal collection and vandalism of cacti are both occurring, despite these and other provisions that specifically prohibit these activities. Insufficient implementation or enforcement of these statutes constitutes a threat to both *Consolea corallicola* and *Harrisia aboriginum* as they continue to decline in numbers.

Shell mounds on State land, some of which support populations of *Harrisia aboriginum*, are protected as historical resources under Florida Statute 267.13, sections (1)(a) and (b). Despite these protections, there is a long history of utilization and excavation of shell mounds by artifact hunters in Florida, causing erosion and opening areas for invasion by invasive plants (FNAI 2010i, p.3).

The Florida Division of Forestry (FDOF) administers Florida's outdoor burning and forest fire laws. Florida Statute 590.08 prohibits any person to willfully or carelessly burn or cause to be burned, or to set fire to or cause fire to be set to, any forest, grass, woods, wildland, or marshes not owned or controlled by such person. Despite this protection, unauthorized bonfires have been documented at sites supporting *Harrisia aboriginum* (Woodmansee *et al.* 2007, p. 108; Bender 2011, pp. 5–6).

Federal

National Park Service (NPS) regulations at 36 CFR 2.1 prohibit visitors from harming or removing plants, listed or otherwise, from ENP or BNP.

The Archaeological Resources Protection Act of 1979 (ARPA) (16 U.S.C. 470aa-470mm) protects archaeological sites, including shell mounds, on Federal lands. Shell mounds are known from the area of ENP where *Chromolaena frustrata* occurs; however the Service has no specific information regarding illegally excavated or vandalized shell mounds at ENP.

The Service has no information concerning ENP's or BNP's implementation or the enforcement of these Federal regulations protecting the plants and their habitats from harm. Insufficient implementation or enforcement could become a threat to the two species in the future if the species continue to decline in numbers.

Summary of Factor D

In summary, there are currently State regulatory mechanisms and NPS regulatory mechanisms that provide for the conservation of *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*. Despite the existing regulatory mechanisms, these species continue to decline due to the effects of a wide array of threats, and it is reasonable to conclude that the limitations of current regulatory mechanisms have allowed population declines of *Chromolaena frustrata* and *Consolea corallicola* due to habitat loss and modification and declines of *Consolea corallicola* and *Harrisia aboriginum* due to poaching, vandalism, and illegal bonfires.

Based on our analysis of the best available information, we find that existing regulatory mechanisms, due to their inherent limitations and constraints, are inadequate to address threats to these species throughout their ranges. We have no information to indicate that poaching, unauthorized fires, or habitat loss will be ameliorated in the future

by enforcement of existing regulatory mechanisms. Therefore, we find it reasonably likely that the effects on *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* will continue at current levels or potentially increase in the future.

E. Other Natural or Manmade Factors Affecting Their Continued Existence

Wildfire

Wildfire, whether naturally ignited or caused by unauthorized burning, such as bonfires, is a threat to *Consolea corallicola* and *Harrisia aboriginum*. In general these plants do not survive fires, making this a severe threat to remaining populations and occupied sites. At a site in Sarasota County, a large illegal bonfire pit is located within the habitat that supports one of the larger populations of *H. aboriginum*. The bonfires occur just a few yards from the plants (Bender 2011, pp. 5–6). At least one plant was killed by an escaped fire that affected part of this site in 2006 (Woodmansee *et al.* 2007, p. 108) and should another fire escape into occupied habitat in the future, it is reasonable to conclude this could result in the loss of individuals or extirpation of populations.

Nonnative Plant Species

Nonnative, invasive plant species are a threat to all three species (Morris and Miller 1981, pp. 1–11; Bradley *et al.* 2004, pp. 6, 25; Woodmansee *et al.* 2007, p. 91; Bradley and Gann 2004, p. 8; Bradley 2007, pers. comm.; Sadle 2010, pers. comm.; McDonough 2010b, pers. comm.). They compete with native plants for space, light, water, and nutrients, and they have caused population declines in all three species.

Schinus terebinthifolius (Brazilian pepper), a nonnative, invasive tree, occurs in

all of the habitats of the three species. *Schinus terebinthifolius* forms dense thickets of tangled, woody stems that completely shade out and displace native vegetation (Loflin 1991, p. 19; Langeland and Craddock-Burks 1998, p. 54). *Schinus terebinthifolius* can dramatically change the structure of rockland hammocks, coastal berms, and shell mounds, making habitat conditions unsuitable for *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*, which prefer moderate to full sun exposure. For example, at more than one site, numerous *H. aboriginum* plants occurring in the shade of *S. terebinthifolius* were observed to have died (Bradley *et al.* 2004, p. 10; Bender 2011, pp. 5, 13). By the mid-1990s, *S. terebinthifolius* had spread dramatically and had become a dominant woody species at sites known to support *H. aboriginum* (Morris and Miller 1981, pp. 5, 10; Loflin 1991, p. 19; Herwitz *et al.* 1996, pp. 705–715; Bradley *et al.* 2004, p. 7). *Schinus terebinthifolius* is a threat to populations of *Chromolaena frustrata* along the Coastal Prairie Trail in ENP (Sadle 2010, pers. comm.) and is invading the habitat of *Consolea corallicola* (McDonough 2010b, pers. comm.).

Colubrina asiatica (lather leaf), a nonnative shrub, has invaded large areas of coastal berm and coastal berm edges (Bradley and Gann 2004, p. 4). *Colubrina asiatica* also forms dense thickets and mats, and is of particular concern in coastal hammocks (Langeland and Craddock-Burks 1998, p. 122). *Colubrina asiatica* is invading large areas of hammocks within ENP along the edge of Florida Bay (Bradley and Gann 1999, p. 37). Populations of *Chromolaena frustrata* along the Coastal Prairie Trail and habitat within ENP face threats from *Colubrina asiatica* (Sadle pers. comm. 2010). *Colubrina asiatica* is also present in BNP in areas supporting *Consolea corallicola* (McDonough 2010b, pers. comm.).

Casuarina equisetifolia (Australian pine) invades coastal berm and is a threat to suitable habitat at most sites that could support all three species (FNAI 2010a, p. 2).

Casuarina equisetifolia forms dense stands that exclude all other species through dense shade and a thick layer of needles that contain substances that leach out and suppress the growth of other plants. Coastal strand habitat that once supported *Harrisia aboriginum* has experienced dramatic increases in *C. equisetifolia* over the past 30 years (Loflin 1991, p. 19; Herwitz *et al.* 1996, pp. 705–715).

Other invasive plant species that are a threat to *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* include *Scaevola taccada* (beach naupaka), *Neyraudia reynaudiana* (Burma reed), *Cupaniopsis anacardioides* (carrotwood) *Thespesia populnea* (Portia tree), *Manilkara zapota* (sapodilla), *Hibiscus tiliaceus* (hau), and *Hylocereus undatus* (night blooming cactus) (FNAI 2010f, p. 4; Bradley *et al.* 2004, p. 13; McDonough 2010b, pers. comm.;).

Vandalism

Vandalism is a threat to *Consolea corallicola* and *Harrisia aboriginum*, and has caused population declines in both species. For *Consolea corallicola*, vandalism has been documented twice. In 1990, branches were cut off plants at one site, but instead of being taken (as would be the case for poaching), the cut stems were left at the base of plants. In 2003, vegetative recruits and pads were damaged by unauthorized removal of protective cages from plants (Slapcinsky *et al.* 2006, p. 3). At a Sarasota County site, the Service has documented numerous *H. aboriginum* plants that have been uprooted, trampled, and hacked with sharp implements. This population is impacted by people who

use the coastal berm and hammock interface to engage in a variety of recreational (including unauthorized) activities as evidenced by a very large bonfire site and vast quantities of garbage, bottles, and discarded clothing (Bender 2011, p. 5).

Due to their historic significance and possible presence of artifacts, shell mounds are susceptible to vandalism by artifact hunters. Despite regulations that protect these sites on State lands (Florida Statute 267. 13), there is a long history of artifact hunters conducting unauthorized excavation of shell mounds in Florida, including some mounds where *Harrisia aboriginum* has been found, causing erosion and opening areas for invasion by nonnative plants (FNAI 2010i, p.3).

Recreation

Recreational activities may inadvertently impact some populations of *Chromolaena frustrata*. These activities may affect some individual plants in some populations but have not likely caused significant population declines in the species. Foot traffic and campsites at Big Munson Island may be a threat to *Chromolaena frustrata*. Recreation is a threat to some populations of *Harrisia aboriginum*. Coastal berms and dunes are impacted by recreational activities that cause trampling of plants, exacerbate erosion, and facilitate invasion by nonnative plants. As noted above, in 2011, numerous plants at a Sarasota County site were observed to be intentionally uprooted, hacked, and trampled, and there was a large amount of trash deposited nearby. At the same site, there is an ongoing problem with recreational bonfires in the coastal berm habitat just a few yards from *H. aboriginum* plants (Bradley *et al.* 2004, p. 16;

Woodmansee *et al.* 2007, p.108; Bender 2011, pp. 5–6). One escaped bonfire has the potential to destroy this entire population.

Hurricanes, Storm Surge, and Extreme High Tide Events

Hurricanes, storm surge, and extreme high tide events are natural events that can pose a threat to all three species. Hurricanes and tropical storms can modify habitat (e.g., through storm surge) and have the potential to destroy entire populations. Climate change may lead to increased frequency and duration of severe storms (Golladay *et al.* 2004, p. 504; McLaughlin *et al.* 2002, p. 6074; Cook *et al.* 2004, p. 1015). All three species experienced these disturbances historically, but had the benefit of more abundant and contiguous habitat to buffer them from extirpations. With most of the historical habitat having been destroyed or modified, the few remaining populations of these species could face local extirpations due to stochastic events.

The Florida Keys were impacted by three hurricanes in 2005: Katrina on August 26th, Rita on September 20th, and Wilma on October 24th. Hurricane Wilma had the largest impact, with storm surges flooding much of the landmass of the Keys. The vegetation in many areas was top-killed due to salt water inundation (Hodges and Bradley 2006, p. 9).

Chromolaena frustrata

The ecology of coastal rock barrens is poorly understood. Periodic storm events may be responsible for maintaining the community (Bradley and Gann 1999, p. 37). There is some evidence that, over the long term, hurricanes can be beneficial to the

species by opening up tree canopies allowing more light to penetrate, thereby creating the necessary conditions for growth (Woodmansee *et al.* 2007, p. 115). The large population of *Chromolaena frustrata* observed at Big Munson Island in 2004 suggests that this species may respond positively to occasional hurricanes or tropical storms that thin hammock canopies, providing more light (Bradley and Gann 2004, p. 8). Populations of *C. frustrata* in ENP initially appeared to have been eliminated by storm surge during Hurricane Wilma in 2005 (Bradley 2007, pers. comm.; Duquesnel 2005, pers. comm.), and habitat was significantly altered (Maschinski 2007, pers. comm.). All communities where *C. frustrata* was found showed impacts from the 2005 hurricane season, primarily thinning of the canopy and numerous blow downs (Sadle 2007, pers. comm.). However, it appears that the species has returned to some locations (Bradley 2009, pers. comm.). The population of *C. frustrata* in ENP may have benefited from hurricanes; surveys at some sites in ENP in 2007 detected more plants than ever previously reported (Sadle 2007, pers. comm.). However, if nonnative, invasive plants are present at sites when a storm hits, they may respond similarly, becoming dominant and not allowing for a pulse in the population of native species. This may radically alter the long-term population dynamics of *C. frustrata*, keeping population sizes small or declining, until they eventually disappear (Bradley and Gann 2004, p. 8).

Consolea corallicola

Suitable habitat such as coastal rock barrens on Key Largo have been inundated with saltwater during spring and fall high tides over the past 5 to 10 years; these extreme events killed planted *Consolea corallicola* at one location (Duquesnel 2011a, pers.

comm.). In the future, sea level rise could cause increases in flooding frequency or duration, prolonged or complete inundation of plants, and loss of suitable habitat (see *Climate Change and Sea Level Rise*, below for more information).

Harrisia aboriginum

In 2004, Hurricane Charley, a Category 4 hurricane, passed within 8 km (5 miles) of seven populations of *Harrisia aboriginum* and within 29 km (18 miles) of all populations (Bradley and Woodmansee 2004, p. 1). Several populations suffered damage and loss of plants (Nielsen 2007, pers. comm.; Woodmansee *et al.* 2007, p. 85) due to fallen limbs and shock caused by the sudden increase in sun exposure when the canopy was opened. However, some plants damaged by Hurricane Charley in 2004 have since recovered and seem to be thriving (Nielsen 2009, pers. comm.).

Freezing Temperatures

Occasional freezing temperatures that occur in south Florida are a threat to *Chromolaena frustrata* (Bradley 2009, pers. comm.; Sadle 2011, pers. comm.) and *Harrisia aboriginum* (Woodmansee *et al.* 2007, p. 91). Under normal circumstances, occasional freezing temperatures would not result in a significant impact to these species; however, the small size of some populations makes impacts from freezing more significant.

Effects of Small Population Size and Isolation

Endemic species whose populations exhibit a high degree of isolation are extremely susceptible to extinction from both random and nonrandom catastrophic natural or human-caused events. Species that are restricted to geographically limited areas are inherently more vulnerable to extinction than widespread species because of the increased risk of genetic bottlenecks, random demographic fluctuations, climate change, and localized catastrophes such as hurricanes and disease outbreaks (Mangel and Tier 1994, p. 607; Pimm *et al.* 1988, p. 757). These problems are further magnified when populations are few and restricted to a very small geographic area, and when the number of individuals is very small. Populations with these characteristics face an increased likelihood of stochastic extinction due to changes in demography, the environment, genetics, or other factors (Gilpin and Soule 1986, pp. 24–34).

Small, isolated populations often exhibit reduced levels of genetic variability, which diminishes the species' capacity to adapt and respond to environmental changes, thereby decreasing the probability of long-term persistence (e.g., Barrett and Kohn 1991, p. 4; Newman and Pilson 1997, p. 361). Very small plant populations may experience reduced reproductive vigor due to ineffective pollination or inbreeding depression. Isolated individuals have difficulty achieving natural pollen exchange, which limits the production of viable seed. The problems associated with small population size and vulnerability to random demographic fluctuations or natural catastrophes are further magnified by synergistic interactions with other threats, such as those discussed above (Factors A, B, and C).

Chromolaena frustrata

The current range of *Chromolaena frustrata* includes eight populations spread across 209 km (130 mi) between ENP and Boca Grande Key; four of eight *C. frustrata* populations consist of fewer than 100 individuals (see Table 1). These populations may not be viable in the long term due to their small number of individuals. Threats exacerbated by small population size include hurricanes, storm surges, freezing temperatures, and recreation impacts.

Consolea corallicola

The two natural populations of *Consolea corallicola* are spread across 193 km (120 mi) between Biscayne Bay and Big Pine Key. One of the two remaining natural populations of *C. corallicola* consists of fewer than 20 adult plants (see Table 2). Threats exacerbated by small population size include hurricanes, storm surges, and poaching. Populations can also be impacted by demographic stochasticity, where populations are skewed toward either male or female individuals by chance. This may be the case with *C. corallicola*, in which the two remaining populations do not contain any female plants. While the species may continue to reproduce indefinitely by clonal means, populations may not be viable over the long term due to a lack of genetic mixing and thus the potential to adapt to environmental changes.

Harrisia aboriginum

The current range of *Harrisia aboriginum* spans such a small geographic area (100-km (62-mi)) stretch of coastline north to south that all populations could be affected by a single event (e.g., hurricane). Six of the 12 remaining populations have 10

or fewer individual plants (see Table 3). Threats exacerbated by small population size include hurricanes, storm surges, freezing temperatures, recreation impacts, wildfires, and poaching.

Chromolaena frustrata, *Consolea corallicola*, and *Harrisia aboriginum* have restricted geographic distributions, and few populations, some or all of which are relatively small in number and extent. Therefore, it is essential to maintain the habitats upon which they depend, which require protection from disturbance caused by development, recreational activities and facilities maintenance, nonnative species, or a combination of these. Due to ongoing and pervasive threats, the number and size of existing populations of these species are probably not sufficient to sustain them into the future.

Climate Change and Sea Level Rise

Climatic changes, including sea level rise, are major threats to south Florida and *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*. Our analyses under the Act include consideration of ongoing and projected changes in climate. The terms “climate” and “climate change” are defined by the Intergovernmental Panel on Climate Change (IPCC). “Climate” refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007, p. 78). The term “climate change” thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended

period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007, p. 78). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative, and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). In our analyses, we use our expert judgment to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

Projected changes in climate and related effects can vary substantially across and within different regions of the world (e.g., IPCC 2007a, pp. 8–12). Thus, although global climate projections are informative and in some cases are the only or the best scientific information available, to the extent possible we use “downscaled” climate projections, which provide higher resolution information that is more relevant to the spatial scales used to assess effects to a given species (see Glick *et al.* 2011, pp. 58–61 for a discussion of downscaling).

With regard to our analysis for *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*, downscaled projections suggest that sea-level rise is the largest climate-driven challenge to low-lying coastal areas and refuges in the subtropical ecoregion of southern Florida (U.S. Climate Change Science Program (CCSP) 2008, pp. 5–31, 5–32). The long-term record at Key West shows that sea level rose on average 0.224 cm (0.088 in) annually between 1913 and 2006 (National Oceanographic and Atmospheric Administration (NOAA) 2008, p. 1). This equates to approximately 22.3 cm (8.76 in) over the last 100 years (NOAA 2008, p. 1). IPCC (2008, p. 28) emphasized

it is very likely that the average rate of sea level rise during the 21st century will exceed that rate, although it was projected to have substantial geographical variability.

Other processes expected to be affected by climate change include temperatures, rainfall (amount, seasonal timing, and distribution), and storms (frequency and intensity). Temperatures are projected to rise from 2 °C to 5 °C (35.6 °F to 41.5 °F) for North America by the end of this century (IPCC 2007, pp. 7-9, 13).

The Nature Conservancy (TNC) modeled several scenarios for the Florida Keys, and predicted that sea level rise will first result in the conversion of habitat, and eventually the complete inundation of habitat. In the best-case scenario, by the year 2100, a rise of 18 cm (7 in) would result in the inundation of 745 ha (1,840 acres) (34 percent) of Big Pine Key and the loss of 11 percent of the island's upland habitat (TNC 2010, p. 1). In the worst-case scenario, a rise of 140 cm (4.6 ft) would result in the inundation of about 2,409 ha (5,950 acres) (96 percent) and the loss of all upland habitat on the Key (TNC 2010, p. 1).

Hydrology has a strong influence on plant distribution in these and other coastal areas (IPCC 2008, p. 57). Such communities typically grade from salt to brackish to freshwater species. From the 1930s to 1950s, increased salinity of coastal waters contributed to the decline of cabbage palm forests in southwest Florida (Williams *et al.* 1999, pp. 2056–2059), expansion of mangroves into adjacent marshes in the Everglades (Ross *et al.* 2000, pp. 9, 12–13), and loss of pine rockland in the Keys (Ross *et al.* 1994, pp. 144, 151–155). The possible effects of sea level rise were noted in the 1980s, at a site supporting *Harrisia aboriginum* (Morris and Miller 1981, p. 10), and recent deaths of cabbage palms at this location suggest that this is a continuing threat (Bradley *et al.* 2004,

p. 7). Furthermore, Ross *et al.* (2000, pp. 109-111) suggested that interactions between sea level rise and pulse disturbances (e.g., storm surges) can cause vegetation to change sooner than projected based on sea level alone. Patterns of development will also likely be significant factors influencing whether natural communities can move and persist (IPCC 2008, p. 57; CCSP 2008, p. 7–6).

Most populations of *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* are located just slightly above mean sea level, and the effects of sea level rise are expected to be a continual problem for coastal species and habitats (Gann *et al.* 2002, p. 391, 481; Bradley *et al.* 2004, p. 7; Sadle 2007, pers. comm.; Higgins 2007, pers. comm.; Duquesnel 2008, pers. comm.). Research on *C. corallicola* (Stiling 2010, p. 2) and other Florida cacti suggests that increased soil salinity levels can cause mortality of these plants (Goodman *et al.* 2012, pp. 9–11). Natural populations of *Harrisia aboriginum* and *Consolea corallicola* do not occur on saturated soils (fresh or saline) and would likely be extirpated at sites affected by sea level rise.

Similarly, the extant populations of *Consolea corallicola* occur near sea level in a transitional zone between mangrove and hardwood hammock habitats. Populations at two sites have been declining for years, and this may be partially attributed to rising sea level, as most of the cacti are on the edge of the hammock and buttonwood transition zone or directly in the transition zone (Higgins 2007, pers. comm.; Duquesnel 2008, 2009, pers. comm.).

Summary of Factor E

In summary, *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia*

aboriginum are vulnerable to a wide array of threats from human activities; invasive, nonnative plant species; small population sizes; weather events, and climate change, which have operated in the past, are impacting these species now, and have caused population declines in all three species. Based on our analysis of the best available information, these threats are likely to continue in the future at current levels or potentially increasing.

Cumulative Effects of Threats

The limited distributions and small population sizes of *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* make them extremely susceptible to further habitat loss and competition from nonnative species. Poaching, vandalism, and wildfires are additional threats to *C. corallicola* and *H. aboriginum*. Mechanisms leading to the decline of these species as discussed above, range from local (e.g., poaching, vandalism, wildfire), to regional (e.g., development, nonnative species), to global (e.g., climate change, sea level rise). The synergistic (interaction of two or more components) effects of threats (such as hurricane effects on a species with a limited distribution consisting of just a few small populations) make it difficult to predict population viability. While these stressors may act in isolation, it is more probable that many stressors are acting simultaneously (or in combination) on populations of *Chromolaena frustrata*, *Consolea corallicola*, and *H. aboriginum*.

Proposed Determination

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*. Section 3(6) of the Act defines an endangered species as “any species that is in danger of extinction throughout all or a significant portion of its range,” and section 3(20) of the Act defines a threatened species as “any species that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.”

As described in detail above, these three species are currently at risk throughout all of their respective ranges due to the immediacy, severity, and scope of threats from habitat destruction and modification (Factor A), inadequacy of existing regulatory mechanisms (Factor D), and other natural or manmade factors affecting their continued existence (Factor E). *Consolea corallicola* and *Harrisia aboriginum* are currently at risk throughout all of their respective ranges due to the immediacy, severity, and scope of threats from overutilization (Factor B), and *C. corallicola* is immediately threatened by disease or predation (Factor C). Although there are ongoing actions to alleviate some threats, there appear to be no populations without current significant threats. Current State and Federal regulatory mechanisms (Factor D) are inadequate to protect *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* from taking and habitat loss. Despite the existing regulatory mechanisms, *Chromolaena frustrata*, *Consolea corallicola*, and *H. aboriginum* continue to decline. In particular, poaching remains a concern for *Consolea corallicola*, and *H. aboriginum*. Habitat loss or modification from development (Factor A) and sea level rise, competition from nonnative plants, small population sizes, and restricted range (Factor E) are threats to all three

species. Hurricanes, storm surge, and future sea level rise are threats to all three species through direct mortality of individuals and modification of habitat. The majority of the remaining *C. frustrata*, *C. corallicola*, and *H. aboriginum* populations are generally small and geographically isolated. The narrow distribution of their populations in hurricane-prone south Florida makes them more susceptible to extirpation from a single catastrophic event. Furthermore, this level of isolation makes natural recolonization of extirpated populations virtually impossible without human intervention.

Chromolaena frustrata

Chromolaena frustrata has been extirpated (no longer in existence) from half of the islands in the Florida Keys where it historically occurred, and threats of competition from nonnative, invasive plants (Factor E) and habitat loss (Factor A) are currently active in the remaining populations. Populations of *Chromolaena frustrata* are isolated from one another, and the species has a limited ability to recolonize suitable habitat between populations. Because of the current condition of the populations and life-history traits of the species, it is vulnerable to natural or human-caused changes in its currently occupied habitats. Significant threats are occurring now and are likely to continue in the foreseeable future, at a high intensity, and across the species' entire range; therefore, we have determined the species is currently on the brink of extinction. Because these threats are placing the species in danger of extinction now and not only at some point in the foreseeable future, we find this species meets the definition of an endangered species versus a threatened species. Therefore, we are proposing to list it as an endangered species. We are not proposing threatened species status for *C. frustrata* due to the high

level of continuing threats described above. These threats described above are currently active, and will continue to affect the populations of *C. frustrata* into the foreseeable future, and these threats will individually and collectively contribute to the species' local extirpation and potential extinction.

Consolea corallicola

Consolea corallicola has been extirpated from half of the islands in the Florida Keys where it historically occurred. Threats of poaching and vandalism (Factor B), predation by a nonnative moth, disease (Factor C), competition from nonnative, invasive plant species and wildfire (Factor E), and habitat loss (Factor A) still exist in the remaining populations. Additionally, low genetic diversity and lack of sexual reproduction are threats to *C. corallicola*. Because there are only a few small populations of this cactus, and the remoteness of occupied habitat that makes enforcement difficult, collection has and continues to be a significant threat to the species. Existing regulatory mechanisms (Factor D) at the State level are inadequate to protect the species from poaching or vandalism. Because populations are isolated and the species has a limited ability to recolonize suitable habitats, it continues to be vulnerable to natural or human-caused changes in its habitats. As a result, impacts from continuing threats, singly or in combination, are likely to result in the extinction of this species. Significant threats are occurring now and are likely to continue in the foreseeable future, at a high intensity, and across the species' entire range; therefore, we have determined the species is currently on the brink of extinction. Because these threats are placing the species in danger of extinction now and not only at some point in the foreseeable future, we find this species

meets the definition of an endangered species, versus a threatened species. Therefore, we are proposing to list it as an endangered species. We are not proposing threatened status for *C. corallicola* due to the severity of the threats described above. These threats described above are currently active, and will continue to affect the populations of *C. corallicola* into the foreseeable future, and these threats will individually and collectively contribute to the species' local extirpation and potential extinction.

Harrisia aboriginum

Harrisia aboriginum has been extirpated from the northern extent of its range in Manatee County, and threats of poaching (Factor B), competition from nonnative, invasive plant species, wildfire (Factor E), disease, predation (Factor C), vandalism (Factor B), and habitat loss (Factor A) still exist in the remaining populations. Because there are only a few small populations of this cactus, and the remoteness of occupied habitat that makes enforcement difficult, collection has and continues to be a significant threat to this species. Existing regulatory mechanisms (Factor D) at the State level are inadequate to protect this species from poaching or vandalism. Because populations are isolated and the species has a limited ability to recolonize historically occupied habitats, it is vulnerable to natural or human-caused changes in its habitats. As a result, impacts from increasing threats, singly or in combination, are likely to result in the extinction of the species. Significant threats are occurring now and are likely to continue in the foreseeable future, at a high intensity, and across the species' entire range; therefore, we have determined the species is currently on the brink of extinction. Because these threats are placing the species in danger of extinction now and not only at some point in the

foreseeable future, we find this species meets the definition of an endangered species, versus a threatened species. Therefore, we are proposing to list it as an endangered species. We are not proposing threatened status for *H. aboriginum* due to the severity of the threats described above. These threats described above are currently active, and will continue to affect the populations of *H. aboriginum* into the foreseeable future, and these threats will individually and collectively contribute to the species' local extirpation and potential extinction.

Significant Portion of Its Range

We evaluated the current range of the *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* to determine if there is any apparent geographic concentration of potential threats for either species. All three species are highly restricted in their ranges, and the threats occur throughout their ranges. We considered the potential threats due to habitat loss or modification from development and sea level rise, competition from nonnative plants, hurricanes, storm surge, small populations, and restricted range. We found no concentration of threats because of the species' limited and curtailed ranges, and uniformity of the threats throughout their entire ranges. Having determined that *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* are endangered throughout their entire ranges, it is not necessary to evaluate whether there are any significant portions of their ranges.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in public awareness and conservation by Federal, State, and local agencies; private organizations; and individuals. The Act encourages cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required of Federal agencies and the prohibitions against take and harm are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Subsection 4(f) of the Act requires the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning includes the development of a recovery outline shortly after a species is listed and after preparation of a draft and final recovery plan. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan identifies site-specific management actions that set a

trigger for review of the five factors that control whether a species remains endangered or may be down listed or delisted, and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (comprising species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our website (<http://www.fws.gov/endangered>), or from our South Florida Ecological Services Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribal, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g., restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. Achieving recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands.

If these species are listed, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost share grants for non-Federal landowners, the academic community, and non-governmental organizations. In addition, under section 6 of the Act, the State of Florida would be eligible for Federal funds to implement management actions that promote the protection and recovery of *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*. Information on

our grant programs that are available to aid species recovery can be found at:

<http://www.fws.gov/grants>.

Although *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* are only being proposed for listing under the Act at this time, please let us know if you are interested in participating in recovery efforts for this species. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Federal agencies are required to confer with us informally on any action that is likely to jeopardize the continued existence of a proposed species. Section 7(a)(4) requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may adversely affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

Federal agency actions within these species' habitats that may require conference or consultation or both as described in the preceding paragraph include, but are not limited to, the funding of, carrying out or issuance of permits for resource management activities, development of facilities, road and trail construction, recreational programs, and any other any landscape-altering activities on Federal lands administered by the

Department of Defense, NPS, Fish and Wildlife Service, and U.S. Forest Service; or the issuance of Federal permits under section 404 of the Clean Water Act (33 U.S.C. 1251 *et seq.*) by the U.S. Army Corps of Engineers; construction and management of gas pipeline and power line rights-of-way by the Federal Energy Regulatory Commission; and construction and maintenance of roads or highways by the Federal Highway Administration.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to endangered plants. All prohibitions of section 9(a)(2) of the Act, implemented by 50 CFR 17.61, apply. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to import or export, transport in interstate or foreign commerce in the course of a commercial activity, sell or offer for sale in interstate or foreign commerce, or remove and reduce the species to possession from areas under Federal jurisdiction. In addition, for plants listed as an endangered species, the Act prohibits the malicious damage or destruction on areas under Federal jurisdiction and the removal, cutting, digging up, or damaging or destroying of such plants in knowing violation of any State law or regulation, including State criminal trespass law. Certain exceptions to the prohibitions apply to agents of the Service and State conservation agencies.

Preservation of native flora of Florida (Florida Statutes 581.185) sections (3)(a) and (b) provide limited protection to species listed in the State of Florida Regulated Plant Index including *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*, as described under Factor D. *The Inadequacy of Existing Regulatory Mechanisms*.

Federal listing increases protection by for these species by making violations of sSection 3 of the Florida Statute punishable as a Federal offense under section 9 of the Act. This provides increased protection from unauthorized collecting and vandalism for the plants on State and private lands, where they might not otherwise be protected by the Act, and increases the severity of the penalty for unauthorized collection, vandalism, or trade in these species.

We may issue permits to carry out otherwise prohibited activities involving endangered and threatened plant species under certain circumstances. Regulations governing permits are codified at 50 CFR 17.62 for endangered plants, and at 50 CFR 17.72 for threatened plants. With regard to endangered plants, a permit must be issued for the following purposes: For scientific purposes or to enhance the propagation or survival of the species.

The Service acknowledges that it cannot fully address some of the natural threats facing *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* (e.g., hurricanes, tropical storms) or even some of the other significant, long-term threats (e.g., climatic changes, sea level rise). However, through listing, we provide protection to the known population(s) and any new population of the species that may be discovered (see discussion below). With listing, we can also influence Federal actions that may potentially impact the species (see discussion below); this is especially valuable if it is found at additional locations. With this action, we are also better able to deter illicit collection and trade.

It is our policy, as published in the **Federal Register** on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those

activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a proposed listing on proposed and ongoing activities within the range of species proposed for listing. The following activities could potentially result in a violation of section 9 of the Act; this list is not comprehensive:

(1) Import any such species into, or export any such species from, the United States;

(2) Remove and reduce to possession any such species from areas under Federal jurisdiction; maliciously damage or destroy any such species on any such area; or remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law;

(3) Deliver, receive, carry, transport, or ship in interstate or foreign commerce, by any means whatsoever and in the course of a commercial activity, any such species;

(4) Sell or offer for sale in interstate or foreign commerce any such species;

(5) Introduce any nonnative wildlife or plant species to the State of Florida that compete with or prey upon *Chromolaena frustrata*, *Consolea corallicola*, or *Harrisia aboriginum*;

(6) Release any unauthorized biological control agents that attack any life stage of *Chromolaena frustrata*, *Consolea corallicola*, or *Harrisia aboriginum*;

(7) Modify the habitat of *Chromolaena frustrata*, *Consolea corallicola*, or *Harrisia aboriginum* on Federal lands that is unauthorized or not covered under the Act for impacts to these species.

Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the Field Supervisor of the Service's South Florida Ecological Services Office (see **FOR FURTHER INFORMATION CONTACT**). Requests for copies of regulations regarding listed species and inquiries about prohibitions and permits should be addressed to the U.S. Fish and Wildlife Service, Ecological Services Division, Endangered Species Permits, 1875 Century Boulevard, Atlanta, GA 30345 (Phone 404-679-7140; Fax 404-679-7081).

If *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* are listed under the Act, the State of Florida's Endangered Species Act (Florida Statutes 581.185) is automatically invoked, which would also prohibit take of these species and encourage conservation by State government agencies. Further, the State may enter into agreements with Federal agencies to administer and manage any area required for the conservation, management, enhancement, or protection of endangered species (Florida Statutes 581.185). Funds for these activities could be made available under section 6 of the Act (Cooperation with the States). Thus, the Federal protection afforded to these species by listing them as endangered species would be reinforced and supplemented by protection under State law.

Critical Habitat Designation for *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*:

Background

It is our intent to discuss below only those topics directly relevant to the designation of critical habitat for *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum* in this section of the proposed rule.

Critical habitat is defined in section 3 of the Act as:

(1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features

(a) Essential to the conservation of the species and

(b) Which may require special management considerations or protection; and

(2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse

modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation does not allow the government or public to access private lands. Such designation does not require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the consultation requirements of section 7(a)(2) of the Act would apply, but even in the event of a destruction or adverse modification finding, the obligation of the Federal action agency and the landowner is not to restore or recover the species, but to implement reasonable and prudent alternatives to avoid destruction or adverse modification of critical habitat.

Prudency Determination

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12), require that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time we determine that a species is endangered or threatened. Our regulations (50 CFR 424.12(a)(1)) state that the designation of critical habitat is not prudent when one or both of the following situations exist: (1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of threat to the species; or (2) such designation of critical habitat would not be beneficial to the species. This determination involves a weighing of the expected increase in threats associated with a critical habitat designation against the benefits gained by such designation. We have determined that for *Consolea*

corallicola and *Harrisia aboriginum*, identification of critical habitat can be expected to increase the degree of threat to the species from over utilization by collectors and poachers and that the benefits of designating critical habitat are minimal.

Increased Threat to the Consolea corallicola and Harrisia aboriginum by Designating Critical Habitat

Rare cacti are highly desirable to collectors and often targeted for collection in the wild (Anderson 2001, pp. 73–78). The Service has documented unauthorized collection of both *Consolea corallicola* and *Harrisia aboriginum* on public lands in Florida. Collection appears to be ongoing, prevalent, and damaging (see Factor B analysis above for specific cases). In addition, we are aware that a market exists for trade in rare, imperiled, and federally-listed cacti, including those in south Florida (see Factor B analysis above). For example, there is currently a demand for *Harrisia fragrans*, a rare cactus from south Florida that is listed (under the scientific name *Cereus eriophorus* var. *fragrans*) as an endangered species under the Act, and that closely resembles *H. aboriginum*. Websites currently offer for sale seeds of *C. corallicola* and *H. aboriginum*. It is clear that a demand currently exists for specimens of both cacti.

Due to the low number of populations, small population sizes, restricted range, and remoteness of occupied habitat (which makes enforcement difficult), we believe that collection is a significant and continuing threat to *Consolea corallicola* and *Harrisia aboriginum*. Even limited collection from the remaining populations (or other populations, if discovered) could have significant and long-lasting deleterious effects on reproductive and genetic viability and thus could contribute to the extinction of these

cacti. Identification of critical habitat units would increase the severity of this threat by describing the exact locations where the species may be found and more widely publicizing this information, exposing small, isolated populations and habitat to greater risks of collection and vandalism.

Designation of critical habitat requires the publication of maps and a narrative description of specific critical habitat units in the **Federal Register**. The degree of detail in those maps and boundary descriptions would be greater than what is currently available to the public. Thus, designation of critical habitat could more widely announce the exact location of the two cacti to collectors and poachers, and further encourage and facilitate unauthorized collection and trade. Due to their extreme rarity (a low number of individuals, combined with small areas inhabited by the remaining populations), these cacti are highly vulnerable to collection. We believe that these threats would be exacerbated by the publication of maps and descriptions outlining the specific locations of these cacti in the **Federal Register**, on Service websites, and in local newspapers.

Identification and publication of critical habitat for *Consolea corallicola* and *Harrisia aboriginum* would also likely increase enforcement problems. Although take prohibitions exist, effective enforcement is difficult. As discussed under Factors B, D, and E and elsewhere above, the threats of collection and inadvertent impacts from human activities exists and areas where the species currently exist are already difficult to patrol due to the remoteness of those areas. Many of the areas supporting the cacti are remote and accessible mainly by boat, making them difficult for law enforcement personnel to patrol and monitor, and more desirable for illegal activities. Limited patrolling is available for resource protection on the lands supporting *Consolea corallicola* and

Harrisia aboriginum. We believe that designation of critical habitat would facilitate further use and misuse of sensitive habitats and resources, creating additional difficulty for law enforcement personnel in an already challenging environment. Overall, we believe that designation of critical habitat would increase the likelihood and severity of the threats of illegal collection of *C. corallicola* and *H. aboriginum*, as well as exacerbate enforcement issues.

Benefits to Conus corallicola and Harrisia aboriginum from Critical Habitat

Designation

The principal benefit of including an area in critical habitat is the requirement for agencies to ensure actions they fund, authorize, or carry out are not likely to result in the destruction or adverse modification of any designated critical habitat, the regulatory standard of section 7(a)(2) of the Act under which consultation is completed. Critical habitat provides protections only where there is a Federal nexus, that is, those actions that come under the purview of section 7 of the Act. Critical habitat designation has no application to actions that do not have a Federal nexus. Section 7(a)(2) of the Act mandates that Federal agencies, in consultation with the Service, evaluate the effects of its their proposed actions on any designated critical habitat. Similar to the Act's requirement that a Federal agency action not jeopardize the continued existence of listed species, Federal agencies have the responsibility not to implement actions that would destroy or adversely modify designated critical habitat.

Federal actions affecting the species even in the absence of designated critical habitat areas would still benefit from consultation pursuant under to section 7(a)(2) of the

Act and may still result in jeopardy findings. However, the analysis of effects of a proposed project on critical habitat is separate and distinct from that of the effects of a proposed project on the species itself. The jeopardy analysis evaluates the action's impact to survival and recovery of the species, while the destruction or adverse modification analysis evaluates the action's effects to the designated habitat's contribution to conservation of the species. Therefore, the difference in outcomes of these two analyses represents the regulatory benefit of critical habitat. This would, in some instances, lead to different results and different regulatory requirements. Thus, critical habitat designations may provide greater benefits to the recovery of a species than would listing alone.

Consolea corallicola

All areas known to support populations of *Consolea corallicola* are on Federal, State, or private conservation lands; these areas are currently being managed at some level for the species. Management efforts include nonnative species control and efforts to detect and control *Cactobalastis cactorum*. These efforts are consistent with, and tailored for, *C. corallicola* conservation, and such efforts are expected to continue in the future. Because *C. corallicola* is restricted to two small natural populations, with by far the largest occurring on NPS land, any future activity involving a Federal action that would destroy or adversely modify occupied critical habitat would also be expected to jeopardize the species' continued existence (see Jeopardy Standard within proposed rule). On the other hand, designation of unoccupied critical habitat for *C. corallicola* would provide a measureable regulatory benefit in those instances when a Federal action

occurred in only unoccupied critical habitat. Because *C. corallicola* has been extirpated from half of the islands where it occurred in the Florida Keys, designation of critical habitat for this species could cover a large area. Thus, for the species if consultation on the Federal action was found to likely destroy or adversely modify unoccupied critical habitat but not jeopardize the continued existence of the species, a measurable regulatory benefit would be realized. In the absence of a critical habitat designation, Federal lands that support *C. corallicola* would continue to be subject to conservation actions implemented under section 7(a)(1) of the Act and to the regulatory protections by the section 7(a)(2) jeopardy standard consultation requirements and may still result in jeopardy findings. Therefore, designation of specific areas as critical habitat that are currently occupied is unlikely to provide a measurable benefit to the species while designation of unoccupied areas as critical habitat could provide a measurable benefit to the species.

Harrisia aboriginum

All *Harrisia aboriginum* populations are at least in part on protected Federal, State, County, and private conservation lands. A few plants are located on private non-conservation parcels adjacent to larger populations on protected conservation sites. Most, but not all, of the protected sites are currently being managed at some level for the species. Management efforts are limited to nonnative species control at this time. These efforts are expected to continue in the future. The Federal listing of the species regardless of critical habitat designation, could result in increased enforcement efforts and population augmentation, although to what extent is unknown. One of the 12 sites

where *H. aboriginum* occurs is on Federal lands and represents approximately one third of all existing individuals and would be subject to section 7(a)(2) consultation requirements of the Act. However, *Harrisia aboriginum* has been extirpated from the northern extent of its range in Manatee County. There are a few small County-owned and private land parcels that are occupied and not currently being managed for the species; and these lands would not be subject the requirements of section 7 consultation without a Federal nexus. Designation of these small parcels as occupied critical habitat would provide limited additional to *H. aboriginum* because a Federal nexus would still be needed to trigger consultation and it is unlikely the loss of the habitat would have an adverse effect on the conservation of the species. If unoccupied critical habitat were designated for *H. aboriginum*, additional habitat could be protected from adverse habitat modification or destruction on State, county, or private land if a Federal nexus were present and the action rose to the level of adversely modifying the critical habitat. Additional unoccupied habitat may be necessary for the recovery of *C. corallicola* and *H. aboriginum*, as areas targeted for reintroduction would likely be on existing State, Federal, or county conservation lands. However, the identification of these lands would increase the risk of poaching in the future at these reintroduced sites.

In summary, for both *Consolea corallicola* and *Harrisia aboriginum*, consultation with respect to critical habitat would provide additional protection to a species if the agency action would result in the destruction or adverse modification of the critical habitat but would not jeopardize the continued existence of the species. In the absence of a critical habitat designation, areas that support *C. corallicola* and *H. aboriginum* would continue to be subject to conservation actions implemented under section 7(a)(1) of the

Act. Also, Federal actions affecting *C. corallicola* and *H. aboriginum* in the absence of designated critical habitat areas would still benefit from consultation pursuant under to section 7(a)(2) of the Act and may still result in jeopardy findings. Therefore, although designation of specific areas as critical habitat that is currently occupied, recently occupied, or unoccupied would provide some additional protections under the Act, that protection is likely to be minimal.

Another potential benefit to *Consolea corallicola* and *Harrisia aboriginum* from designating critical habitat is that it could serve to educate private landowners, and Federal State, and local government agencies, Refuge, or Park visitors, and the general public regarding the potential conservation value of the area for the species. Through the processes of listing the cacti under the State of Florida's endangered species statute and the recognition of the *C. corallicola* and *H. aboriginum* as a Federal candidate species in 2005 and 2006, respectively, much of this educational component is already in effect. Agencies, organizations, and stakeholders are actively engaged in efforts to raise awareness for these cacti and their conservation needs, including the need to deter poaching of wild specimens, designation of critical habitat would help in increasing the awareness. In addition, designation of critical habitat could inform State agencies and local governments about areas that could be conserved under State laws, local ordinances, or land management initiatives by State, local, and Federal agencies. However, nearly all land managers responsible for sites supporting *Consolea corallicola* and *Harrisia aboriginum* are now aware the presence of these species. Designation of critical habitat that is occupied would likely provide benefits concerning awareness by private entities where management for the species could be enhanced or initiated.

Increased Threat to Consolea corallicola and Harrisia aboriginum Outweighs the Benefits of Critical Habitat Designation

Upon reviewing the available information, we have determined that the designation of critical habitat would increase the threat to *Consolea corallicola* and *Harrisia aboriginum* from unauthorized collection and trade, and may further facilitate inadvertent or purposeful disturbance and vandalism to the cacti's habitat. We believe that designation of occupied critical habitat is likely to confer only an educational benefit to these cacti beyond that provided by listing. Alternatively, the designation of unoccupied critical habitat for either species could provide an educational and at least some regulatory benefit for each species. However, we believe that the risk of increasing significant threats to the species by publishing more specific location information in a critical habitat designation greatly outweighs the benefits of designating critical habitat.

In conclusion, we find that the designation of critical habitat is not prudent, in accordance with 50 CFR 424.12(a)(1), because *Consolea corallicola* and *Harrisia aboriginum* are threatened by collection and habitat destruction, and designation can reasonably be expected to increase the degree of these threats to these species and their habitats. Critical habitat designation could provide some benefit to these species, but these benefits are significantly outweighed by the increased risk of collection pressure and enforcement problems that could result from depicting, through publicly available maps and descriptions, exactly where these extremely rare cacti and their habitat can be found.

Determination of prudence for Chromolaena frustrata

In contrast to *Consolea corallicola* and *Harrisia aboriginum*, *Chromolaena frustrata* is not sought after by collectors and there is no evidence that the designation of critical habitat would result in an increased threat from taking (particularly poaching) or other human activity for this species. On the other hand, as for these other species, we find that the designation of critical habitat for *C. frustrata*, as for the other two species, is likely to provide at least some benefit to the species by serving to focus conservation efforts on the restoration and maintenance of ecosystem functions that are essential for attaining its recovery and long-term viability. Similarly, the designation of critical habitat could serve to inform management and conservation decisions by identifying any additional physical and biological features of the ecosystem that may be essential for the conservation of the species. We therefore find that designation of critical habitat for *C. frustrata* is prudent.

Critical Habitat Determinability

Having determined that designation of critical habitat is prudent for *Chromolaena frustrata*, under section 4(a)(3) of the Act, we must find whether critical habitat is determinable for the species. Our regulations at 50 CFR 424.12(a)(2) state that critical habitat is not determinable when one or both of the following situations exist:

- (i) Information sufficient to perform required analyses of the impacts of the designation is lacking; or
- (ii) The biological needs of the species are not sufficiently well known to permit

identification of an area as critical habitat.

We reviewed the available information pertaining to the biological needs of *Chromolaena frustrata* and habitat characteristics where the species is located. This and other information represent the best scientific data available and have led us to conclude that the designation of critical habitat is determinable for *C. frustrata*.

Designation of Critical Habitat

Under the first prong of the Act's definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features (1) which are essential to the conservation of the species and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific and commercial data available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat). In identifying those physical and biological features within an area, we focus on the principal biological or physical constituent elements (primary constituent elements such as roost sites, nesting grounds, seasonal wetlands, water quality, tide, soil type) that are essential to the conservation of the species. Primary constituent elements are the specific elements of physical or biological features that provide for a species' life-history processes, are essential to the conservation of the species.

Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside the geographical area occupied by the species at

the time it is listed, upon a determination that such areas are essential for the conservation of the species. We designate critical habitat in areas outside the geographical area occupied by a species only when a designation limited to its range would be inadequate to ensure the conservation of the species.

Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific data available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the **Federal Register** on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106–554; H.R. 5658)), and our associated Information Quality Guidelines, provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific data available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific data available, to use primary and original sources of information as the basis for recommendations to designate critical habitat.

When we are determining which areas should be designated as critical habitat, our primary source of information is generally the information developed during the listing process for the species. Additional information sources may include the recovery plan for the species, articles in peer-reviewed journals, conservation plans developed by States and counties, scientific status surveys and studies, biological assessments, other unpublished materials, or experts' opinions or personal knowledge.

Habitat is dynamic, and species may move from one area to another over time. We recognize that critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the

species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be needed for recovery of the species. Areas that are important to the conservation of the species, both inside and outside the critical habitat designation, would continue to be subject to: (1) Conservation actions implemented under section 7(a)(1) of the Act, (2) regulatory protections afforded by the requirement in section 7(a)(2) of the Act for Federal agencies to ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species, and (3) section 9 of the Act's prohibitions on taking any individual of the species, including taking caused by actions that affect habitat. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. These protections and conservation tools would continue to contribute to recovery of this species if we list *Chromolaena frustrata*. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans (HCPs), or other species conservation planning efforts if new information available at the time of these planning efforts calls for a different outcome.

Physical or Biological Features

In accordance with section 3(5)(A)(i) and 4(b)(1)(A) of the Act and regulations at 50 CFR 424.12, in determining which areas within the geographical area occupied by the species at the time of listing to designate as critical habitat, we consider the physical or

biological features (PBFs) that are essential to the conservation of the species and which may require special management considerations or protection. These include, but are not limited to:

- (1) Space for individual and population growth and for normal behavior;
- (2) Food, water, air, light, minerals, or other nutritional or physiological requirements;
- (3) Cover or shelter;
- (4) Sites for breeding, reproduction, or rearing (or development) of offspring; and
- (5) Habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of a species.

We derive the specific PBFs for *Chromolaena frustrata* from observations of this species' habitat, ecology, and life history as described below. The PBFs for *C. frustrata* were defined on the basis of the habitat features of the areas actually occupied by the plants, which included climate, substrate types, hydrologic regimes, plant community structure, associated plant species, and locale information.

Space for Individual and Population Growth

Plant Community and Competitive Ability. *Chromolaena frustrata* occurs in communities classified as coastal berms, coastal rock barrens, buttonwood forests, and rockland hammocks restricted to tropical South Florida and the Florida Keys. These communities and their associated native plant species are provided in the **Status Assessment for *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia***

aboriginum section above.

Food, Water, Air, Light, Minerals, or Other Nutritional or Physiological Requirements

Climate (temperature and precipitation). The climate of south Florida where *Chromolaena frustrata* occurs is characterized by distinct wet and dry seasons, a monthly mean temperature above 18 ° (64.4 °F) in every month of the year, and annual rainfall averaging 75 to 150 cm (30 to 60 in) (Gabler *et al.* 1994, p. 211). Freezes can occur in the winter months, but are very infrequent at this latitude in Florida.

Soils. Substrates supporting *Chromolaena frustrata* for anchoring or nutrient absorption vary depending on the habitat and location and include marl (an unconsolidated sedimentary rock or soil consisting of clay and lime) (Sadle, 2008 and 2012, pers. comm.); soils consisting of covering limestone; exposed bare limestone rock or with a thin layer of leaf litter or highly organic soil (Bradley and Gann 1999, p. 37; FNAI 2010d, p.1); or loose sediment formed by a mixture of coarse sand, shell fragments, pieces of coralline algae, and other coastal debris (FNAI 2010a, p.1).

Hydrology. The species requires coastal berms and coastal rock barrens that occur above the daily tidal range, but are subject to flooding by seawater during extreme tides and storm surge. Rockland hammock occurs on high ground that does not regularly flood, but it is often dependent upon a high water table to keep humidity levels high, and they can be inundated during storm surges (FNAI 2010d, p.1).

Sites for Breeding, Reproduction, or Rearing (or Development) of Offspring

The reproductive biology and needs of *Chromolaena frustrata* have not been studied (Bradley and Gann 1999, p. 37). We have no other information available beyond the habitat preferences and demographic trends and life-history cycles. Thus, except habitat requirements discussed above we have no other information regarding the ecology of the species related to reproduction needs.

Habitats Protected from Disturbance or Representative of the Historical, Geographic, and Ecological Distributions of the Species

Chromolaena frustrata continues to occur in habitats that are protected from human-generated disturbances and are representative of the species' historical, geographical, and ecological distribution although its range has been reduced. The species still is found in all of its representative plant communities: rock barrens, coastal berms, buttonwood forest, and rockland hammocks. In addition, representative communities are located on Federal, State, local, and private conservation lands that implement conservation measures benefitting the species.

Disturbance Regime. All of the habitats that support *Chromolaena frustrata* depend on some degree of natural disturbance regime from hurricanes or tidal inundation to reduce the canopy in order to provide light levels sufficient to support the species. The historical frequency and magnitude of hurricanes and tidal inundation has allowed for the persistence of *C. frustrata* by occasionally creating areas of open canopy that support the species.

In the absence of disturbance, some of these habitats may have closed canopies, resulting in areas lacking enough available sunlight to support *Chromolaena frustrata*. However, too frequent or severe disturbance that transitions the habitat toward more saline conditions could result in the decline of the species in the area.

The natural process giving rise to coastal rock barren is not known, but as it occurs on sites where the thin layer of organic soil over limestone bedrock is missing, coastal rock barren may have formed by soil erosion following destruction of the plant cover by fire or storm surge (FNAI 2010c, p. 2).

Fires are rare to nonexistent in coastal rock barren coastal berm, and buttonwood forest communities (FNAI 2010a, b, c, entire). Historically, rockland hammocks in south Florida evolved with fire in the landscape; fire most often extinguished near the edges when it encountered the hammock's moist microclimate and litter layer. However, rockland hammocks are susceptible to damage from fire during extreme drought or when the water table is lowered (FNAI 2010d, p. 2).

Cover or Shelter

Chromolaena frustrata occurs in open canopy and semi-open to closed canopy habitats and thrives in areas of moderate sun exposure (Bradley and Gann 1999, p. 37). The amount and frequency of such microsites varies by habitat type and time, and since the last disturbance. In rockland hammocks, suitable microsites will often be found near the hammock edge where the canopy is most open. However, the species has been observed to spread into the hammocks when canopy cover is reduced by hurricane

damage to canopy trees. More open communities (e.g., coastal berm, buttonwood and salt marsh ecotone) provide more abundant and temporally consistent suitable habitat than communities capable of establishing a dense canopy (e.g., hardwood hammock).

Accordingly, we have determined that *Chromolaena frustrata* requires the following PBFs:

- (1) Upland habitats consisting of coastal berm, coastal rock barren, rockland hammocks, and buttonwood forest;
- (2) Habitats inundated by storm surge or tidal events at a frequency needed to limit plant species competition while not creating too saline conditions;
- (3) Substrate derived from calcareous sand, limestone, or marl to provide anchoring and nutritional requirements;
- (4) Vegetation composition and structure that allows for adequate sunlight, and space for individual growth and population expansion;
- (5) Habitat connectivity of sufficient size and suitability, or habitat that can be restored to these conditions that supports species growth, distribution and population expansion; and
- (6) Disturbance regimes, including hurricanes, and infrequent inundation events that saturate the substrate, to maintain suitable sites for *Chromolaena frustrata* within these habitats.

Primary Constituent Elements for *Chromolaena frustrata*

Under the Act and its implementing regulations, we are required to identify the

PBFs essential to the conservation of *Chromolaena frustrata* in areas occupied at the time of listing, focusing on the features' primary constituent elements (PCEs). Primary constituent elements are those specific elements of the physical or biological features that provide for a species' life-history processes and are essential to the conservation of the species.

We derive the PCEs for *Chromolaena frustrata* primarily based on those PBFs that support the successful functioning of the habitat upon which the species depends. *C. frustrata* is dependent upon functioning habitats to provide its fundamental life requirements, such as substrate, hydrology, disturbance regime, and the species composition and structure of vegetation. The PCEs collectively provide the suite of PBFs essential to meeting the requirements of *C. frustrata*.

Based on our current knowledge of the PBFs and habitat characteristics required to sustain the species' life-history processes, we determine that the PCEs for *C. frustrata* are:

(1) Areas of upland habitats consisting of coastal berm, coastal rock barren, rockland hammocks, and buttonwood forest.

(A) Coastal berm habitat contains:

(1) Open to semi-open canopy, subcanopy, and understory;

(2) Substrate of coarse, calcareous, storm-deposited sediment; and

(3) A plant community of predominately native vegetation and either no competitive nonnative, invasive plant species or such species in quantities low enough to have minimal effect on the survival of *Chromolaena frustrata*. Coastal berm habitat has a canopy vegetated by *Bursera*, *Coccoloba*, *Coccothrinax*, *Guapira*, *Drypetes*, *Genipa*,

and *Metopium*; a subcanopy vegetated by *Eugenia*, *Ximenia*, *Randia*, *Pithecellobium*, *Laguncularia*, *Conocarpus*, *Avicennia*, *Rhizophora*, *Suriana*, *Manilkara*, *Jacquinia*, and *Sideroxylon*; and an understory vegetated by *Borrchia*, *Hymenocallis*, *Capparis*, *Lantana*, *Rivina*, *Sesuvium*, *Distichlis*, and *Sporobolus*.

(B) Coastal rock barren (Keys cactus barren, Keys tidal rock barren) habitat contains:

- (1) Open to semi-open canopy and understory;
- (2) Limestone rock substrate; and
- (3) A plant community of predominately native vegetation and either no competitive nonnative, invasive plant species or such species in quantities low enough to have minimal effect on the survival of *Chromolaena frustrata*. Coastal rock barren habitat has a subcanopy vegetated by *Conocarpus*, *Lycium*, *Gossypium*, *Sideroxylon*, *Pithecellobium*, *Suriana*, *Randia*, *Metopium*, *Acanthocereus*, *Maytenus*, *Opuntia*, *Agave*, *Bursera*, and *Eugenia*; and an understory vegetated by *Evolvulus*, *Cienfuegosia*, *Indigofera*, *Borrchia*, *Sarcocornia*, *Batis*, *Leptochloa*, *Paspalidium*, *Monanthochloe*, *Distichlis*, *Sporobolus*, and *Fimbristylis*.

(C) Rockland hammock habitat contains:

- (1) Canopy gaps and edges with an open to semi-open canopy, subcanopy, and understory;
- (2) Substrate with a thin layer of highly organic soil covering limestone or organic matter that accumulates on top of the underlying limestone; and
- (3) A plant community of predominately native vegetation and either no competitive nonnative, invasive plant species or such species in quantities low

enough to have minimal effect on the survival of *Chromolaena frustrata*.

Rockland hammock has a canopy vegetated by *Bursera*, *Lysiloma*, *Simarouba*, *Krugiodendron*, *Ocotea*, *Piscidia*, *Swietenia*, *Sideroxylon*, *Exothea*, *Ficus*, *Coccoloba*, *Metopium*, *Conocarpus*, *Guapira*, and *Pisonia*; a subcanopy vegetated by *Eugenia*, *Thrinax*, *Amyris*, *Ardisia*, *Psychotria*, *Chrysophyllum*, *Sabal*, *Guaiacum*, *Ximenia*, and *Colubrina*; and an understory vegetated by *Zamia*, *Acanthocereus*, and *Oplismenus*.

(D) Buttonwood forest habitat contains:

- (1) Open to semi-open canopy and understory;
- (2) Substrate with calcareous marl muds, calcareous sands, or limestone rock; and
- (3) A plant community of predominately native vegetation and either no

competitive nonnative, invasive plant species or such species in quantities low enough to have minimal effect on the survival of *Chromolaena frustrata*. Buttonwood forest has a canopy vegetated by *Conocarpus*, and an understory vegetated by *Borrichia*, *Lycium*, and *Limonium*.

(2) A disturbance regime, due to the effects of strong winds or salt-water inundation from storm surge or infrequent tidal inundation, that creates canopy disruption in coastal berm, coastal rock barren, rockland hammocks, and buttonwood forest habitats listed above.

(3) Habitats that are connected and of sufficient area to sustain viable populations in coastal berm, coastal rock barren, rockland hammocks, and buttonwood forest habitats listed above.

Special Management Considerations or Protection

When designating critical habitat, we assess whether the specific areas within the geographic area occupied by the species at the time of listing contain features which are essential to the conservation of the species and which may require special management considerations or protection.

Management considerations or protection are necessary throughout the critical habitat areas proposed here to avoid further degradation or destruction of the habitat that provides those features essential to the species' conservation. The primary threats to the PBFs that *Chromolaena frustrata* depends on include: (1) Habitat destruction and modification by development; (2) competition with nonnative, invasive plant species; (3) wildfire; (4) hurricanes and storm surge; and (5) sea level rise. Some of these threats can be addressed by special management considerations or protection while others (e.g., sea level rise, hurricanes) are beyond the control of land owners and managers. However, while land owners or land managers may not be able to control all the threats, they may be able to address the results of the threats.

Management activities that could ameliorate these threats include the monitoring and minimization of recreational activities impacts, nonnative species control, and protection from development. Precautions are needed to avoid the inadvertent trampling of *Chromolaena frustrata* in the course of management activities and public use. Development of recreation facilities or programs should avoid impacting these habitats directly or indirectly. Ditching should be avoided because it alters the hydrology and species composition of these habitats. Sites that have shown increasing encroachment of woody species over time may require efforts to maintain the open nature of the habitat, which favors these species. Nonnative species control programs are needed to reduce

competition and prevent habitat degradation. The reduction of these threats will require the implementation of special management actions within each of the critical habitat areas identified in this proposed rule. All proposed critical habitat requires active management to address the ongoing threats listed above (and those presented in Factors A through E).

In summary, we find that each of the areas we are proposing as critical habitat that are occupied by *Chromolaena frustrata* contain features essential to the conservation of the species that may require special management considerations or protection to ensure conservation of the species. These special management considerations and protection are required to preserve and maintain the essential features provided to these species by the ecosystems upon which they depend. A more detailed discussion of these threats is presented above in “**Summary of Factors Affecting the Species.**”

Criteria Used To Identify Critical Habitat

As required by section 4(b)(2) of the Act, we use the best scientific data available to designate critical habitat. We reviewed available information pertaining to the habitat requirements of this species. We are proposing to designate critical habitat in areas within the geographical area occupied by *Chromolaena frustrata* at the time of listing. All of these units are designated based on sufficient elements of physical and biological features being present to support known *Chromolaena frustrata* life-history processes.

In accordance with the Act and its implementing regulation at 50 CFR 424.12(e), we considered whether designating additional areas—outside those currently occupied as well as those occupied at the time of listing—are necessary to ensure the conservation of

the species. For the reasons described below, we also are proposing to designate specific areas outside the geographical area currently occupied by the species (that would mean occupied at the time of listing), but which were historically occupied, because we have determined that such areas are essential for the conservation of the species.

Small populations and plant species with limited distributions, like those of *Chromolaena frustrata*, are vulnerable to relatively minor environmental disturbances (Frankham 2005, pp. 135–136), and are subject to the loss of genetic diversity from genetic drift, the random loss of genes, and inbreeding (Ellstrand and Elam 1993, pp. 217–237; Leimu *et al.* 2006, pp. 942–952). Plant populations with lowered genetic diversity are more prone to local extinction (Barrett and Kohn 1991, pp. 4, 28). Smaller plant populations generally have lower genetic diversity, and lower genetic diversity may in turn lead to even smaller populations by decreasing the species' ability to adapt, thereby increasing the probability of population extinction (Newman and Pilson 1997, p. 360; Palstra and Ruzzante 2008, pp. 3428–3447). Because of the dangers associated with small populations or limited distributions, the recovery of many rare plant species includes the creation of new sites or reintroductions to ameliorate these effects.

When designating critical habitat, we consider future recovery efforts and conservation of the species. Realizing that the current occupied habitat is not enough for the conservation and recovery of *Chromolaena frustrata*, we used habitat and historical occurrence data to identify unoccupied habitat essential for the conservation of the species. The justification for why unoccupied habitat is essential to the conservation of these species and the methodology we used to identify the best unoccupied areas for consideration of inclusion are described below.

Habitat fragmentation can have negative effects on biological populations, especially rare plants, and can affect survival and recovery (Aguilar *et al.* 2006, pp. 968–980; Aguilar *et al.* 2008, pp. 5177–5188; Potts *et al.* 2010, pp. 345–352). Fragments are often not of sufficient size to support the natural diversity prevalent in an area, and thus exhibit a decline in biodiversity (Fahrig 2003, pp. 487–515). Fragmentation effects are especially prevalent in systems where multiple generations have elapsed since the fragmentation occurred (Aguilar *et al.* 2008, p. 5177). Habitat fragmentation has been shown to disrupt plant-pollinator interactions and predator-prey interactions (Steffan-Dewenter and Tscharrntke 1999, pp. 432–440; Aguilar *et al.* 2006, pp. 968–980; Eckert *et al.* 2010, pp. 35–43), alter seed germination percentages (Menges 1991, pp. 158–164), affect recruitment (Santos and Telleria 1997, pp. 181–187; Quesada *et al.* 2003, pp. 400–406), and result in lowered fruit set (Burd 1994, pp. 83–139; Cunningham 2000, pp. 1149–1152; Eckert *et al.* 2010, p. 38).

In general, habitat fragmentation causes habitat loss, habitat degradation, habitat isolation, changes in species composition, changes in species interactions, increased edge effects, and reduced habitat connectivity (Fahrig 2003, pp. 487–515; Fisher and Lindenmayer 2007, pp. 265–280). Habitat fragments are often functionally smaller than they appear because edge effects (such as increased nonnative, invasive species or wind speeds) impact the available habitat within the fragment (Lienert and Fischer 2003, p. 597).

Shaffer and Stein (2000) identify a methodology for conserving imperiled species known as the ‘three Rs’: representation, resiliency, and redundancy. Representation, or preserving some of everything, means conserving not just a species but its associated

plant communities. Resiliency and redundancy ensure there is enough of a species so it can survive into the future. Resiliency means ensuring that the habitat is adequate for a species and its representative components. Redundancy ensures an adequate number of sites and individuals. This methodology has been widely accepted as a reasonable conservation strategy (Tear *et al.* 2005, p. 841).

We have addressed representation through our PCEs (as discussed above) and by providing habitat for *Chromolaena frustrata*. There are only approximately 6,000 to 8,000 known individuals and only 8 populations, four of which have fewer than 100 individuals (low redundancy). Seven of eight populations occur on small islands where the amount of suitable and remaining habitat is limited (low resiliency). For adequate redundancy and resiliency, we believe it is necessary for conservation and recovery that additional populations of *C. frustrata* be established. Therefore, we have proposed two unoccupied areas for designation as critical habitat units on islands of the Florida Keys where *C. frustrata* was historically recorded, but has since been extirpated.

To determine the location and boundaries of critical habitat, the Service used the following sources of information:

- (1) FNAI population records and ArcGIS geographic information system (GIS) software to spatially depict the location and extent of documented populations of *Chromolaena frustrata* (FNAI 2011b, pp. 1–17);
- (2) Reports prepared by botanists with the Institute for Regional Conservation (IRC), NPS, and Florida Department Environmental Protection (FDEP). Some of these were funded by the Service, others were requested or volunteered by biologists with the NPS or FDEP;

(3) Historical records found in reports and associated voucher specimens housed at herbaria, all of which are also referenced in the above mentioned reports from the IRC and FNAI;

(4) Digitally produced habitat maps provided by NPS and Monroe County; and

(5) Aerial images of Miami-Dade and Monroe Counties. The presence of PCEs was determined through the use of GIS spatial data depicting the current habitat status. This habitat data for the Keys were developed by Monroe County from 2006 aerial images, and ground conditions for many areas were checked in 2009. Habitat data for ENP were provided by the NPS. The areas that contain PCEs follow predictable landscape patterns and have a recognizable signature in the aerial photographs.

We have identified areas to include in this proposed designation by applying the following considerations.

The amount and distribution of critical habitat being proposed for designated would allow populations of *Chromoleana frustrata* to:

(1) Maintain their existing distribution;

(2) Expand their distribution into previously occupied areas (needed to offset habitat loss and fragmentation);

(3) Use habitat depending on habitat availability (response to changing nature of coastal habitat including occurring sea level rise) and support genetic diversity;

(4) Increase the size of each population to a level where the threats of genetic, demographic, and normal environmental uncertainties are diminished; and

(5) Maintain their ability to withstand local or unit level environmental

fluctuations or catastrophes.

We utilized the following process to select appropriate critical habitat units for *Chromolaena frustrata*:

Areas Occupied at Time of Listing

(1) For the purpose of designating critical habitat for *Chromolaena frustrata*, we defined the geographical area currently occupied by the species as required by section 3(5)(A)(i) of the Act. Proposed occupied critical habitat units were delineated around extant populations. These units include the mapped extent of the population and adjacent areas that contain the elements of the PBFs that allow for population growth and expansion and to account for dynamic habitat processes (i.e., gain and loss of areas with sufficient light availability due to disturbance of canopy by natural events such as inundation and hurricanes), and habitat transition or loss due to sea level rise. In the ENP, the distribution of *Chromolaena frustrata* is across a larger area than at any other single location. In the Keys, the same criteria were used, but the size of the proposed units is limited by the size of individual islands.

(2) Areas to maintain connectivity of habitat. Some areas that may contain only some of the elements of the PBFs were included if they were contiguous with areas containing one or more of those elements and if they contribute to the hydrologic processes and disturbance regime essential to the ecological function of the system. These areas maintain connectivity within populations and allow for population

expansion.

(3) Areas for restoration. We have selected some areas within occupied units that, once restored, would be able to support expansion and a larger number of the species. These areas generally are habitats within or adjacent to coastal berms, coastal barrens, rockland hammocks, or buttonwood forest that retain some of the elements of the PBFs although some PBFs have been lost through natural or anthropogenic causes. These areas would provide habitat to off-set the anticipated loss and degradation of habitat occurring or expected from the effects of climate change (such as sea level rise) or due to development.

(4) Areas to allow the dynamic nature of coastal berm, buttonwood forest, rockland hammock, and coastal rock barren habitats to respond to hurricane and salt-water inundation. Areas with an open canopy which are suitable for *C. frustrata* are patchy within rockland hammock and coastal rock barren. At any one time, not all the elements of the PBFs are found in these habitats and affect the suitability for *C. frustrata*. The size and location of these areas are dynamic over time, being largely driven by disturbance by hurricanes in hammocks and storm surge in coastal rock barrens. After hurricanes, canopy gaps created by the storm begin to close over time, limiting light availability and suitability of the gap to *C. frustrata*. Thus, these areas could be transitory in providing all the elements of the PBFs as canopy regrows and closes. To address the dynamic nature of these habitats, we included all contiguous habitat associated with a current population record that retains at least one element of the PBFs.

(5) Areas to ensure the persistence of *Chromolaena frustrata* in the face of imminent effects on habitats as a result of sea level rise.

Areas Not Occupied at Time of Listing.

(1) Areas where *Chromolaena frustrata* occurred historically but has since been extirpated. *Chromolaena frustrata* has been extirpated from several locations where it was previously recorded. Of those areas found in reports, we are proposing critical habitat only for those that are well-documented and still retain some or all the elements of the PBFs (i.e., Big Pine Key, Key Largo (Bradley and Gann 2004, pp. 4–6)). Areas such as Fiesta Key and Knight’s Key, which once supported populations of *C. frustrata* but no longer contain any PCEs and cannot be restored, are not included. As it is not always possible to identify that exact location where a specimen was collected, we used available descriptions to speculate upon likely locales, but ultimately were guided by the location of remaining habitats on islands where little of these habitats remain.

(2) Areas of sufficient size to support ecosystem processes for occupied populations of *Chromolaena frustrata*. Large contiguous parcels of habitat are more likely to be resilient to ecological processes of disturbance and succession, and support viable populations of *Chromolaena frustrata*.

When determining proposed critical habitat boundaries, we made every effort to avoid including developed areas such as lands covered by buildings, pavement, and other structures because such lands lack physical or biological features for *Chromolaena frustrata*. The scale of the maps we prepared under the parameters for publication within the Code of Federal Regulations may not reflect the exclusion of such developed lands.

Any such lands inadvertently left inside critical habitat boundaries shown on the maps of this proposed rule have been excluded by text in the proposed rule and are not proposed for designation as critical habitat. Therefore, if the critical habitat is finalized as proposed, a Federal action involving these lands would not trigger section 7 consultation with respect to critical habitat and the requirement of no adverse modification unless the specific action would affect the physical or biological features in the adjacent critical habitat.

The critical habitat designation is defined by the map or maps, as modified by any accompanying regulatory text, presented at the end of this document in the rule portion. We include more detailed information on the boundaries of the critical habitat designation in the preamble of this document. We will make the coordinates or plot points or both on which each map is based available to the public on <http://www.regulations.gov> at Docket No. **FWS-R4-ES-2012-0076**, on our Internet sites (<http://www.fws.gov/verobeach/>), and at the field office responsible for the designation (see **FOR FURTHER INFORMATION CONTACT** above).

Proposed Critical Habitat Designation

We are proposing nine units as critical habitat for *Chromolaena frustrata*. The critical habitat areas we describe below constitute our current best assessment of areas that meet the definition of critical habitat for *C. frustrata*. The nine areas we propose as critical habitat are: (1) Everglades National Park; (2) Key Largo; (3) Upper Matecumbe Key; (4) Lignumvitae Key; (5) Lower Matecumbe Key; (6) Long Key; (7)

Big Pine Key; (8) Big Munson Island; and (9) Boca Grande Key. Landownership within the proposed critical habitat consists of Federal (62 percent), State (30 percent), and private and other (8 percent). Table 4 summarizes these units.

TABLE 4. *Chromolaena frustrata* proposed critical habitat units.

Unit Number	Unit Name	Ownership	Percent	Hectares	Acres	PCEs present	Occupied
1	Everglades National Park	Federal	100	1,525	3,768	coastal berm, rockland hammock, buttonwood forest	yes
		<i>Total</i>	<i>100</i>	<i>1,525</i>	<i>3,768</i>		
2	Key Largo	Federal	23	325	803	coastal berm, rockland hammock, buttonwood forest	no
		State	63	878	2,170		
		Private	13	185	457		
		<i>Total</i>	<i>100</i>	<i>1,388</i>	<i>3,430</i>		
3	Upper Matecumbe Key	State	34	9	22	coastal berm, coastal rock barren, rockland hammock	yes
		Private	66	18	44		
		<i>Total</i>	<i>100</i>	<i>27</i>	<i>66</i>		
4	Lignumvitae Key	State	100	73	180	rockland hammock, buttonwood forest	yes
		<i>Total</i>	<i>100</i>	<i>73</i>	<i>180</i>		
5	Lower Matecumbe Key	State	49	9	22	coastal berm, coastal rock barren, rockland hammock, buttonwood forest	yes
		Private	51	9	22		
		<i>Total</i>	<i>100</i>	<i>18</i>	<i>44</i>		
6	Long Key	State	73	61	151	coastal berm, coastal rock barren, rockland hammock, buttonwood forest	yes
		Private	27	23	57		
		<i>Total</i>	<i>100</i>	<i>84</i>	<i>208</i>		
7	Big Pine Key	Federal	88	277	684	coastal berm, coastal rock barren, rockland hammock, buttonwood forest	no
		Private	12	38	94		
		<i>Total</i>	<i>100</i>	<i>315</i>	<i>778</i>		
8	Big Munson	Private	100	11	27	coastal berm, rockland hammock,	yes

	Island	<i>Total</i>	<i>100</i>	<i>11</i>	<i>27</i>	buttonwood forest	
9	Boca Grande Key	Federal	100	25	62	coastal berm, rockland hammock, buttonwood forest	yes
		<i>Total</i>	<i>100</i>	<i>25</i>	<i>62</i>		
Total All Units		Federal	62 percent	2,152	5,318		
		State	30 percent	1,030	2,545		
		Private and Other	8 percent	284	702		
		All		3,466	8,565		

Note: Area sizes may not sum due to rounding

Seven of the nine critical habitat units proposed for *Chromolaena frustrata* are also currently designated under the Act for the wintering piping plover (*Charadrius melodus*) and the American crocodile (*Crocodylus acutus*). The specific units, and the species for which they are designated are shown in Table 4.

TABLE 5—Critical habitat areas proposed for *Chromolaena frustrata* that are currently designated or proposed as critical habitat for other federally listed species.

Proposed Unit (Unit #)	Species for which Critical Habitat is Designated	Federal Register Reference
Unit 1- Everglades National Park	American Crocodile	50 CFR 17.95(c)
Unit 2 - Key Largo	American Crocodile	50 CFR 17.95(c)
Unit 3 - Upper Matecumbe Key	American Crocodile	50 CFR 17.95(c)
Unit 4- Lignumvitae Key	American Crocodile	50 CFR 17.95(c)
Unit 5 - Lower Matecumbe Key	American Crocodile	50 CFR 17.95(c)
Unit 6 - Long Key	American Crocodile	50 CFR 17.95(c)
Unit 9 - Boca Grande Key	Wintering piping plover; Unit FL-29	50 CFR 17.95(b)

We present brief descriptions of all units and reasons why they meet the definition of critical habitat for *Chromolaena frustrata*, below.

Unit 1: Everglades National Park, Monroe County and Miami-Dade County

Unit 1 consists of 1,525 ha (3,768 ac) in Monroe County and Miami-Dade County. This unit is comprised entirely of lands in Federal ownership, 100 percent of

which are located within the ENP along the southern coast of Florida from Cape Sable to Trout Cove, located between the mean high water line to approximately 4.02 km (2.5 miles) inland. This unit is currently occupied and contains the features essential to the conservation of the species. The unit contains coastal berm, rockland hammock, and buttonwood forest PCEs. This unit contains all the PBFs, including suitable climate, hydrology, substrate, associated native plant species, and disturbance regimes, required by the species. The PBFs in this unit may require special management considerations or protection to address threats of nonnative plant species and sea level rise.

Unit 2: Key Largo, Monroe County

Unit 2 consists of 1,388 ha (3,430 ac) in Monroe County. This unit is comprised of Federal lands within Crocodile Lake National Wildlife Refuge (NWR) (325 ha (803 ac)); State lands within Dagny Johnson Botanical State Park, John Pennekamp Coral Reef State Park, and the Florida Keys Wildlife and Environmental Area (878 ha (2,170 ac)); and parcels in private ownership (185 ha (457 ac)).

This unit extends from near the northern tip of Key Largo, along the length of Key Largo, beginning at the south shore of Ocean Reef Harbor near South Marina Drive and the intersection of County Road (CR) 905 and Clubhouse Road on the west side of CR 905, and between CR 905 and Old State Road 905, then extending to the shoreline south of South Harbor Drive. The unit then continues on both sides of CR 905 through the Crocodile Lake NWR, Dagny Johnson Key Largo Hammock Botanical State Park, and John Pennekamp Coral Reef State Park. The unit then terminates near the junction of U.S. 1 and CR 905 and Garden Cove Drive. The unit resumes on the east side of U.S. 1

from South Andros Road to Key Largo Elementary; then from intersection of Taylor Drive and Pamela Street to Avenue A; then from Sound Drive to the intersection of Old Road and Valencia Road; then resumes on the east side of U.S. 1 from Hibiscus Lane and Ocean Drive. The unit continues south near the Port Largo Airport from Poisonwood Road to Bo Peep Boulevard. The unit resumes on the west side of U.S. 1 from the intersection of South Drive and Meridian Avenue to Casa Court Drive. The unit then continues on the west side of U.S. 1 from the point on the coast directly west of Peace Avenue south to Caribbean Avenue. The unit also includes a portion of the barrier island in Largo Sound located directly east of Avenue A, extending south to a point directly east of Mahogany Drive. This unit is not currently occupied but contains habitat essential to the conservation of the species because it serves to protect habitat needed to recover the species, reestablish wild populations within the historical range of the species, and maintain populations throughout the historic distribution of the species in the Florida Keys, and provides area for recovery in the case of stochastic events that otherwise would eliminate the species from the one or more locations it is presently found.

Unit 3: Upper Matecumbe Key, Monroe County

Unit 3 consists of 27 ha (66 ac) in Monroe County. This unit is comprised of State lands within Lignumvitae Key State Botanical Park, Indian Key Historical State Park (9 ha (22 ac)); City of Islamorada lands within the Key Tree Cactus Preserve and Green Turtle Hammock Park and parcels in private ownership (18 ha (44 ac)). This unit extends from Matecumbe Avenue south to Seashore Avenue along either side of U.S. 1. The unit then continues along the west side of U.S. 1, including the Green Turtle

Hammock Park and a nature preserve owned by the City of Islamorada; straddles U.S. 1 in the vicinity of Indian Key Historical Park; and continues for 0.8 km (0.5 mi) to near the tip southern tip of Key Largo on the west side of U.S. 1.

This unit is currently occupied and contains the features essential to the conservation of the species. It contains the PCEs of coastal berm, coastal rock barren, and rockland hammock. This unit contains all PBFs, including suitable climate, hydrology, substrate, associated native plant species, and disturbance regimes, required by the species. The PBFs in this unit may require special management considerations or protection to address threats of nonnative species and sea level rise.

Unit 4: Lignumvitae Key, Monroe County

Unit 4 consists of 73 ha (180 ac) in Monroe County. This unit is comprised entirely of lands in State ownership, 100 percent of which are located within the Lignumvitae Key Botanical State Park (LKBSP).

This unit is currently occupied and contains the features essential to the conservation of the species. This unit includes all PCEs of rockland hammock and buttonwood forest habitat that occur within LKBSP on Lignumvitae Key. This unit contains all PBFs, including suitable climate, hydrology, substrate, associated native plant species, and disturbance regimes, required by the species. The PBFs in this unit may require special management considerations or protection to address threats of nonnative species and sea level rise.

Unit 5: Lower Matecumbe Key, Monroe County

Unit 5 consists of 18 ha (44 ac) in Monroe County. The unit is comprised of State lands within Lignumvitae Key State Botanical Park, parcels owned by the Florida Department of Transportation (9 ha (22 ac)); and parcels in private ownership (9 ha (22 ac)). This unit extends from the east side of U.S. 1 from 0.2 km (0.14 mi) from the north edge of Lower Matecumbe Key, situated across U.S. 1 from Davis Lane and Tiki Lane. The unit continues on either side of U.S. 1 approximately 0.4 mi (0.6 km) from the north edge of Lower Matecumbe Key for approximately 0.9 km (0.6 mi).

This unit is currently occupied and contains the features essential to the conservation of the species. It contains all PBFs, including suitable climate, hydrology, substrate, associated native plant species, and disturbance regimes, required by the species. The PBFs in this unit may require special management considerations or protection to address threats of nonnative species and sea level rise.

Unit 6: Long Key, Monroe County

Unit 6 consists of 84 ha (208 ac) in Monroe County. This unit is comprised of State lands within Long Key State Park (61 ha (151 ac)) and parcels in private ownership (23 ha (57 ac)). The unit extends from the southwestern tip of Long Key along the island's west and south shores.

The unit is currently occupied and contains the features essential to the conservation of the species. It contains the PCEs of coastal berm, coastal rock barren, rockland hammock, and buttonwood forest. This unit contains all PBFs, including suitable climate, hydrology, substrate, associated native plant species, and disturbance regimes required by the species. The PBFs in this unit may require special management

considerations or protection to address threats of development, nonnative species, and sea level rise.

Unit 7: Big Pine Key, Monroe County

Unit 7 consists of 315 ha (778 ac) in Monroe County. Unit 7 consists of 315 ha (778 ac) in Monroe County. This unit is comprised of Federal land within the National Key Deer Refuge (NKDR) (277 ha (684 ac)) and parcels in private ownership (38 ha (94 ac)). This unit extends from near the northern tip of Big Pine Key along the eastern shore to the vicinity of Hellenga Drive and Watson Road; from Gulf Boulevard south to West Shore Drive; from the southwest tip of Big Pine Key, bordered by Big Pine Avenue and Elma Avenues on the east, Coral and Yacht Club Road, and U.S. 1 on the north, and Industrial Avenue on the east; extending along the undeveloped portion of Long Beach Drive; and from the southeastern tip of Big Pine Key to Avenue A.

This unit is not currently occupied but is essential to the conservation of the species because it serves to protect habitat needed to recover the species, reestablish wild populations within the historical range of the species, and maintain populations throughout the historic distribution of the species in the Florida Keys, and it provides area for recovery in the case of stochastic events that otherwise hold the potential to eliminate the species from the one or more locations where it is presently found.

Unit 8: Big Munson Island, Monroe County

Unit 8 consists of 11 ha (27 ac) in Monroe County. This unit is comprised entirely of lands in private ownership, owned by the Boy Scouts of America.

This unit is occupied and contains the features essential to the conservation of the species. It includes all the PCEs of coastal berm, rockland hammock, and buttonwood forest habitat that occur on Big Munson Island. This unit contains all PBFs, including suitable climate, hydrology, substrate, associated native plant species, and disturbance regimes, required by the species. The PBFs in this unit may require special management considerations or protection to address threats of development, recreation, small population size, nonnative species, and sea level rise.

Unit 9: Boca Grande Key, Monroe County

Unit 9 consists of 25 ha (62 ac) in Monroe County. This unit is comprised entirely of lands in Federal ownership, 100 percent of which is located within the Key West National Wildlife Refuge (NWR).

This unit is occupied and contains features essential to the conservation of the species. This unit includes all the PCEs of coastal berm, rockland hammock, and buttonwood forest habitat on the island, comprising the entirety of Boca Grande Key. This unit contains all PBFs, including suitable climate, hydrology, substrate, associated native plant species, and disturbance regimes, required by the species. The PBFs in this unit may require special management considerations or protection to address threats of nonnative species and sea level rise.

Effects of Critical Habitat Designation

Section 7 Consultation

Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. In addition, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of proposed critical habitat.

Decisions by the United States Courts of Appeal for the Fifth and Ninth Circuits have invalidated our regulatory definition of “destruction or adverse modification” (50 CFR 402.02) (see *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, 378 F.3d 1059 (9th Cir. 2004) and *Sierra Club v. U.S. Fish and Wildlife Service et al.*, 245 F.3d 434, 442 (5th Cir. 2001)), and we do not rely on this regulatory definition when analyzing whether an action is likely to destroy or adversely modify critical habitat. Under the provisions of the Act, we determine destruction or adverse modification on the basis of whether, with implementation of the proposed Federal action, the affected critical habitat would continue to serve its intended conservation role for the species.

If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of actions that are subject to the section 7 consultation process are actions on State, tribal, local, or private lands that require a Federal permit (such as a permit from the U.S. Army Corps of Engineers under section 404 of the Clean Water Act or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the

Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat, and actions on State, tribal, local, or private lands that are not federally funded or authorized, do not require section 7 consultation.

As a result of section 7 consultation, we document compliance with the requirements of section 7(a)(2) through our issuance of:

- (1) A concurrence letter for Federal actions that may affect, but are not likely to adversely affect, listed species or critical habitat; or
- (2) A biological opinion for Federal actions that may affect, or are likely to adversely affect, listed species or critical habitat.

When we issue a biological opinion concluding that a project is likely to jeopardize the continued existence of a listed species and/or destroy or adversely modify critical habitat, we provide reasonable and prudent alternatives to the project, if any are identifiable, that would avoid the likelihood of jeopardy and/or destruction or adverse modification of critical habitat. We define “reasonable and prudent alternatives” (at 50 CFR 402.02) as alternative actions identified during consultation that:

- (1) Can be implemented in a manner consistent with the intended purpose of the action,
- (2) Can be implemented consistent with the scope of the Federal agency’s legal authority and jurisdiction,
- (3) Are economically and technologically feasible, and
- (4) Would, in the Director’s opinion, avoid the likelihood of jeopardizing the continued existence of the listed species and/or avoid the likelihood of destroying or

adversely modifying critical habitat.

Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of the project. Costs associated with implementing a reasonable and prudent alternative are similarly variable.

Regulations at 50 CFR 402.16 require Federal agencies to reinitiate consultation on previously reviewed actions in instances where we have listed a new species or subsequently designated critical habitat that may be affected and the Federal agency has retained discretionary involvement or control over the action (or the agency's discretionary involvement or control is authorized by law). Consequently, Federal agencies sometimes may need to request reinitiation of consultation with us on actions for which formal consultation has been completed, if those actions with discretionary involvement or control may affect subsequently listed species or designated critical habitat.

Application of the "Adverse Modification" Standard

The key factor related to the adverse modification determination is whether, with implementation of the proposed Federal action, the affected critical habitat would continue to serve its intended conservation role for the species. Activities that may destroy or adversely modify critical habitat are those that alter the physical or biological features to an extent that appreciably reduces the conservation value of critical habitat for *Chromolaena frustrata*. As discussed above, the role of critical habitat is to support life-history needs of the species and provide for the conservation of the species.

Section 4(b)(8) of the Act requires us to briefly evaluate and describe, in any proposed or final regulation that designates critical habitat, activities involving a Federal

action that may destroy or adversely modify such habitat, or that may be affected by such designation.

Activities that may affect critical habitat, when carried out, funded, or authorized by a Federal agency, should result in consultation for *Chromolaena frustrata*. These activities include, but are not limited to:

(1) Actions that would significantly alter the hydrology or substrate, such as ditching or filling. Such activities may include, but are not limited to, road construction or maintenance, and residential, commercial, or recreational development.

(2) Actions that would significantly alter vegetation structure or composition, such as clearing vegetation for construction of residences, facilities, trails, and roads.

(3) Actions that would introduce nonnative species that would significantly alter vegetation structure or composition. Such activities may include, but not limited to, residential and commercial development, and road construction.

Exemptions

Application of Section 4(a)(3) of the Act

The Sikes Act Improvement Act of 1997 (Sikes Act) (16 U.S.C. 670a) required each military installation that includes land and water suitable for the conservation and management of natural resources to complete an integrated natural resources management plan (INRMP) by November 17, 2001. An INRMP integrates implementation of the military mission of the installation with stewardship of the natural resources found on the base. Each INRMP includes:

(1) An assessment of the ecological needs on the installation, including the need

to provide for the conservation of listed species;

(2) A statement of goals and priorities;

(3) A detailed description of management actions to be implemented to provide for these ecological needs; and

(4) A monitoring and adaptive management plan.

Among other things, each INRMP must, to the extent appropriate and applicable, provide for fish and wildlife management; fish and wildlife habitat enhancement or modification; wetland protection, enhancement, and restoration where necessary to support fish and wildlife; and enforcement of applicable natural resource laws.

The National Defense Authorization Act for Fiscal Year 2004 (Pub. L. 108–136) amended the Act to limit areas eligible for designation as critical habitat. Specifically, section 4(a)(3)(B)(i) of the Act (16 U.S.C. 1533(a)(3)(B)(i)) now provides: “The Secretary shall not designate as critical habitat any lands or other geographic areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation.” There are no Department of Defense lands with a completed INRMP within the proposed critical habitat designation for *Chromolaena frustrata*.

Exclusions

Application of Section 4(b)(2) of the Act

Section 4(b)(2) of the Act states that the Secretary must designate and make revisions to critical habitat on the basis of the best available scientific data after taking into consideration the economic impact, national security impact, and any other relevant impact of specifying any particular area as critical habitat. The Secretary may exclude an area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines, based on the best scientific data available, that the failure to designate such area as critical habitat will result in the extinction of the species. In making that determination, the statute on its face, as well as the legislative history, are clear that the Secretary has broad discretion regarding which factor(s) to use and how much weight to give to any factor.

Under section 4(b)(2) of the Act, we may exclude an area from designated critical habitat based on economic impacts, impacts on national security, or any other relevant impacts. In considering whether to exclude a particular area from the designation, we identify the benefits of including the area in the designation, identify the benefits of excluding the area from the designation, and evaluate whether the benefits of exclusion outweigh the benefits of inclusion. If the analysis indicates that the benefits of exclusion outweigh the benefits of inclusion, the Secretary may exercise his discretion to exclude the area only if such exclusion would not result in the extinction of the species.

Economic Impacts

Under section 4(b)(2) of the Act, we consider the economic impacts of designating any particular area as critical habitat. In order to consider economic impacts, we are preparing an economic analysis of the proposed critical habitat designation and

related factors.

We will announce the availability of our draft economic analysis as soon as it is completed. During the development of a final designation, we will consider the draft economic analysis, public comments, and other new information related to economic impacts, and as a result areas that were proposed for critical habitat may be excluded from the final critical habitat designation under section 4(b)(2) of the Act and our implementing regulations at 50 CFR 424.19.

National Security Impacts

Under section 4(b)(2) of the Act, we consider whether there are lands where a national security impact might exist. In preparing this proposal, we have determined that none of the lands within the proposed designation of critical habitat for *Chromolaena frustrata* are owned or managed by the Department of Defense, or designated for its use, and, therefore, we anticipate no impact on national security. Consequently, the Secretary does not intend to exercise his discretion to exclude any areas from the final designation based on impacts on national security.

Other Relevant Impacts

Under section 4(b)(2) of the Act, we consider any other relevant impacts, in addition to economic impacts and impacts on national security. We consider a number of factors, including whether the landowners have developed any HCPs or other management plans for the area, or whether there are conservation partnerships that would be encouraged by designation of, or exclusion of lands from, critical habitat. In addition,

we look at any tribal issues, and consider the government-to-government relationship of the United States with tribal entities. We also consider any social impacts that might occur because of the designation.

In preparing this proposed rule, we have determined that there are currently no HCPs or other management plans that affect *Chromolaena frustrata* or its proposed critical habitat. Furthermore, we are not aware of any potential social impacts that might occur because of the designation. Accordingly, the Secretary does not intend to exercise his discretion to exclude any areas from the final designation based on other relevant impacts.

Peer Review

In accordance with our joint policy on peer review published in the **Federal Register** on July 1, 1994 (59 FR 34270), we will seek the expert opinions of at least three appropriate and independent specialists regarding this proposed rule. The purpose of peer review is to ensure that our proposed listing and critical habitat designation are based on scientifically sound data, assumptions, and analyses. We have invited these peer reviewers to comment during this public comment period on our specific proposed rule.

We will consider all comments and information we receive during this comment period on this proposed rule during our preparation of a final determination.

Accordingly, the final decision may differ from this proposal.

Public Hearings

Section 4(b)(5) of the Act provides for one or more public hearings on this proposal, if requested. Requests must be received within 45 days after the date of publication of this proposed rule in the **Federal Register**. Such requests must be sent to the address shown in the **FOR FURTHER INFORMATION CONTACT** section. We will schedule public hearings on this proposal, if any are requested, and announce the dates, times, and places of those hearings, as well as how to obtain reasonable accommodations, in the **Federal Register** and local newspapers at least 15 days before the hearing.

Required Determinations

Regulatory Planning and Review (Executive Orders 12866 and 13563)

Executive Order 12866 provides that the Office of Information and Regulatory Affairs (OIRA) will review all significant rules. The Office of Information and Regulatory Affairs has determined that this rule is not significant.

Executive Order 13563 reaffirms the principles of E.O. 12866 while calling for improvements in the nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. The executive order directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory objectives. E.O. 13563 emphasizes further that regulations must be based on the best available science and that the rulemaking process must allow for public participation and

an open exchange of ideas. We have developed this rule in a manner consistent with these requirements.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (RFA; 5 U.S.C. 601 *et seq.*) as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA; 5 U.S.C 801 *et seq.*), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the RFA to require Federal agencies to provide a certification statement of the factual basis for certifying that the rule will not have a significant economic impact on a substantial number of small entities.

According to the Small Business Administration, small entities include small organizations such as independent nonprofit organizations; small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents; and small businesses (13 CFR 121.201). Small businesses include such businesses as manufacturing and mining concerns with fewer than 500 employees, wholesale trade entities with fewer than 100 employees, retail and service businesses with less than \$5 million in annual sales, general and heavy construction businesses with less than \$27.5 million in annual business, special trade contractors doing less than \$11.5

million in annual business, and forestry and logging operations with fewer than 500 employees and annual business less than \$7 million. To determine whether small entities may be affected, we will consider the types of activities that might trigger regulatory impacts under this designation as well as types of project modifications that may result. In general, the term “significant economic impact” is meant to apply to a typical small business firm’s business operations.

Importantly, the incremental impacts of a rule must be *both* significant and substantial to prevent certification of the rule under the RFA and to require the preparation of an initial regulatory flexibility analysis. If a substantial number of small entities are affected by the proposed critical habitat designation, but the per-entity economic impact is not significant, the Service may certify. Likewise, if the per-entity economic impact is likely to be significant, but the number of affected entities is not substantial, the Service may also certify.

Under the RFA, as amended, and following recent court decisions, Federal agencies are only required to evaluate the potential incremental impacts of rulemaking on those entities directly regulated by the rulemaking itself, and not the potential impacts to indirectly affected entities. The regulatory mechanism through which critical habitat protections are realized is section 7 of the Act, which requires Federal agencies, in consultation with the Service, to ensure that any action authorized, funded, or carried by the Agency is not likely to adversely modify critical habitat. Therefore, only Federal action agencies are directly subject to the specific regulatory requirement (avoiding destruction and adverse modification) imposed by critical habitat designation. Under these circumstances, it is our position that only Federal action agencies will be directly

regulated by this designation. Therefore, because Federal agencies are not small entities, the Service certifies that the proposed critical habitat rule will not have a significant economic impact on a substantial number of small entities.

We acknowledge, however, that in some cases, third-party proponents of the action subject to permitting or funding may participate in a section 7 consultation, and thus may be indirectly affected. We believe it is good policy to assess these impacts if we have sufficient data before us to complete the necessary analysis, whether or not this analysis is strictly required by the RFA. While this regulation would not directly regulate these entities, in our draft economic analysis we will conduct a brief evaluation of the potential number of third parties participating in consultations on an annual basis in order to ensure a more complete examination of the incremental effects of this proposed rule in the context of the RFA.

In conclusion, we believe that, based on our interpretation of directly regulated entities under the RFA and relevant case law, this designation of critical habitat would only directly regulate Federal agencies, which are not by definition small business entities. Accordingly, we certify that, if promulgated, this designation of critical habitat would not have a significant economic impact on a substantial number of small business entities. Therefore, an initial regulatory flexibility analysis is not required. However, though not necessarily required by the RFA, in our draft economic analysis for this proposal we will consider and evaluate the potential effects to third parties that may be involved with consultations with Federal action agencies related to this action.

Energy Supply, Distribution, or Use—Executive Order 13211

Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use) requires agencies to prepare Statements of Energy Effects when undertaking certain actions.

All proposed units are remote from energy supply, distribution, or use activities. We do not expect that if made final, this designation of critical habitat would significantly affect energy supplies, distribution, or use. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required. However, we will further evaluate this issue as we conduct our economic analysis, and review and revise this assessment as warranted.

Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 *et seq.*), we make the following findings:

(1) This rule would not produce a Federal mandate. In general, a Federal mandate is a provision in legislation, statute, or regulation that would impose an enforceable duty upon State, local, or tribal governments, or the private sector, and includes both “Federal intergovernmental mandates” and “Federal private sector mandates.” These terms are defined in 2 U.S.C. 658(5)–(7). “Federal intergovernmental mandate” includes a regulation that “would impose an enforceable duty upon State, local, or tribal governments” with two exceptions. It excludes “a condition of Federal assistance.” It also excludes “a duty arising from participation in a voluntary Federal program,” unless the regulation “relates to a then-existing Federal program under which \$500,000,000 or more is provided annually to State, local, and tribal governments under

entitlement authority,” if the provision would “increase the stringency of conditions of assistance” or “place caps upon, or otherwise decrease, the Federal Government’s responsibility to provide funding,” and the State, local, or tribal governments “lack authority” to adjust accordingly. At the time of enactment, these entitlement programs were: Medicaid; Aid to Families with Dependent Children work programs; Child Nutrition; Food Stamps; Social Services Block Grants; Vocational Rehabilitation State Grants; Foster Care, Adoption Assistance, and Independent Living; Family Support Welfare Services; and Child Support Enforcement. “Federal private sector mandate” includes a regulation that “would impose an enforceable duty upon the private sector, except (i) a condition of Federal assistance or (ii) a duty arising from participation in a voluntary Federal program.”

The designation of critical habitat does not impose a legally binding duty on non-Federal Government entities or private parties. Under the Act, the only regulatory effect is that Federal agencies must ensure that their actions do not destroy or adversely modify critical habitat under section 7. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency. Furthermore, to the extent that non-Federal entities are indirectly impacted because they receive Federal assistance or participate in a voluntary Federal aid program, the Unfunded Mandates Reform Act would not apply, nor would critical habitat shift the costs of the large entitlement programs listed above onto State governments.

(2) We do not believe that this rule would significantly or uniquely affect small governments because the areas proposed for critical habitat designation are not owned by one Federal, State, or City government. None of these government entities fit the definition of “small governmental jurisdiction.” Therefore, a Small Government Agency Plan is not required. However, we will further evaluate this issue as we conduct our economic analysis, and review and revise this assessment if appropriate.

Takings—Executive Order 12630

In accordance with Executive Order 12630 (Government Actions and Interference with Constitutionally Protected Private Property Rights), we have analyzed the potential takings implications of designating critical habitat for *Chromolaena frustrata* in a takings implications assessment. Critical habitat designation does not affect landowner actions that do not require Federal funding or permits, nor does it preclude development of habitat conservation programs or issuance of incidental take permits to permit actions that do require Federal funding or permits to go forward. The takings implications assessment concludes that this designation of critical habitat for *Chromolaena frustrata* would not pose significant takings implications for lands within or affected by the designation.

Federalism—Executive Order 13132

In accordance with Executive Order 13132 (Federalism), this proposed rule does not have significant Federalism effects. A federalism impact summary statement is not required. In keeping with Department of the Interior and Department of Commerce

policy, we requested information from, and coordinated development of, this proposed critical habitat designation with appropriate State resource agencies in Florida. If finalized, the designation of critical habitat in areas occupied by *Chromolaena frustrata* may impose nominal additional regulatory restrictions to those currently in place and, therefore, may have little incremental impact on State and local governments and their activities. The designation may have some benefit to these governments because the areas that contain the physical or biological features essential to the conservation of the species are more clearly defined, and the elements of the features of the habitat necessary to the conservation of the species are specifically identified. This information does not alter where and what federally sponsored activities may occur. However, it may assist local governments in long-range planning (rather than having them wait for case-by-case section 7 consultations to occur).

Where State and local governments require approval or authorization from a Federal agency for actions that may affect critical habitat, consultation under section 7(a)(2) would be required. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency.

Civil Justice Reform—Executive Order 12988

In accordance with Executive Order 12988 (Civil Justice Reform), the Office of the Solicitor has determined that the rule does not unduly burden the judicial system and

that it meets the requirements of sections 3(a) and 3(b)(2) of the Order. We have proposed designating critical habitat in accordance with the provisions of the Act. This proposed rule uses standard property descriptions and identifies the elements of physical or biological features essential to the conservation of *Chromolaena frustrata* within the designated areas to assist the public in understanding the habitat needs of the species.

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)

This rule does not contain any new collections of information that require approval by OMB under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). This rule will not impose recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq.*), need not be prepared in connection with listing a species as endangered or threatened under the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

It is also our position that, outside the jurisdiction of the U.S. Court of Appeals for the Tenth Circuit, we do not need to prepare environmental analyses pursuant to NEPA in connection with designating critical habitat under the Act. We published a notice

outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244). This position was upheld by the U.S. Court of Appeals for the Ninth Circuit (*Douglas County v. Babbitt*, 48 F.3d 1495 (9th Cir. 1995), cert. denied 516 U.S. 1042 (1996)).

Clarity of the Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

- (1) Be logically organized;
- (2) Use the active voice to address readers directly;
- (3) Use clear language rather than jargon;
- (4) Be divided into short sections and sentences; and
- (5) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in the **ADDRESSES** section. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951),

Executive Order 13175 (Consultation and Coordination With Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with tribes in developing programs for healthy ecosystems, to acknowledge that tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to tribes.

We determined that there are no tribal lands that are currently occupied by *Chromolaena frustrata* that contain the features essential for conservation of the species, and no tribal lands unoccupied by *C. frustrata* that are essential for the conservation of the species. Therefore, we are not proposing to designate critical habitat for *C. frustrata* on tribal lands.

References Cited

A complete list of references cited in this rulemaking is available on the Internet at <http://www.regulations.gov> and upon request from the South Florida Ecological Services Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this package are the staff members of the South Florida

Ecological Services Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

2. Amend § 17.12 (h) by adding entries for *Chromolaena frustrata*, *Consolea corallicola*, and *Harrisia aboriginum*, in alphabetical order under FLOWERING PLANTS, to the List of Endangered and Threatened Plants, to read as follows:

§ 17.12 Endangered and threatened plants

* * * * *

(h) * * *

Species		Historic range	Family	Status	V
Scientific Name	Common name				
FLOWERING PLANTS					
* * * * *					
<i>Chromolaena frustrata</i>	Thoroughwort, Cape Sable	U.S.A. (FL)	Asteraceae	E	
* * * * *					
<i>Consolea corallicola</i>	Cape Sable thoroughwort Cactus, Florida semaphore	U.S.A. (FL) U.S.A. (FL)	NA Cactaceae	E E	
* * * * *					
<i>Harrisia aboriginum</i>	Prickly-apple, aboriginal	U.S.A. (FL)	Cactaceae	E	

3. Amend § 17.96(a) by adding an entry for “*Chromolaena frustrata* (Cape Sable Thoroughwort)” in in alphabetical order under the family Asteraceae, to read as follows:

§ 17.96 Critical habitat—plants.

(a) *Flowering plants.*

* * * * *

Family Asteraceae: *Chromolaena frustrata* (Cape Sable thoroughwort)

(1) Critical habitat units for *Chromolaena frustrata* are depicted for Miami-Dade and Monroe Counties, Florida, on the maps below.

(2) Within these areas, the primary constituent elements of the physical or biological features essential to the conservation of *Chromolaena frustrata* are:

(i) Areas of upland habitats consisting of coastal berm, coastal rock barren, rockland hammocks, and buttonwood forest.

(A) Coastal berm habitat contains:

(1) Open to semi-open canopy, subcanopy, and understory;

(2) Substrate of coarse, calcareous, storm-deposited sediment; and

(3) A plant community of predominately native vegetation and either no competitive nonnative, invasive plant species or such species in quantities low enough to have minimal effect on survival of *Chromolaena frustrata*. Coastal berm habitat has a canopy vegetated by *Bursera*, *Coccoloba*, *Coccothrinax*, *Guapira*, *Drypetes*, *Genipa*, and *Metopium*; a subcanopy vegetated by *Eugenia*, *Ximenia*, *Randia*, *Pithecellobium*,

Laguncularia, *Conocarpus*, *Avicennia*, *Rhizophora*, *Suriana*, *Manilkara*, *Jacquinia*, and *Sideroxylon*; and an understory vegetated by *Borrchia*, *Hymenocallis*, *Capparis*, *Lantana*, *Rivina*, *Sesuvium*, *Distichlis*, and *Sporobolus*.

(B) Coastal rock barren (Keys cactus barren, Keys tidal rock barren) habitat contains:

(1) Open to semi-open canopy and understory;

(2) Limestone rock substrate; and

(3) A plant community of predominately native vegetation and either no competitive nonnative, invasive plant species or such species in quantities low enough to have minimal effect on survival of *Chromolaena frustrata*. Coastal rock barren habitat has a subcanopy vegetated by *Conocarpus*, *Lycium*, *Gossypium*, *Sideroxylon*, *Pithecellobium*, *Suriana*, *Randia*, *Metopium*, *Acanthocereus*, *Maytenus*, *Opuntia*, *Agave*, *Bursera*, and *Eugenia*; and an understory vegetated by *Evolvulus*, *Cienfuegosia*, *Indigofera*, *Borrchia*, *Sarcocornia*, *Batis*, *Leptochloa*, *Paspalidium*, *Monanthochloe*, *Distichlis*, *Sporobolus*, and *Fimbristylis*.

(C) Rockland hammock habitat contains:

(1) Canopy gaps and edges with an open to semi-open canopy, subcanopy, and understory;

(2) Substrate with a thin layer of highly organic soil covering limestone or organic matter that accumulates on top of the underlying limestone; and

(3) A plant community of predominately native vegetation and either no competitive nonnative, invasive plant species or such species in quantities low enough to have minimal effect on survival of *Chromolaena frustrata*. Rockland hammock has a

canopy vegetated by *Bursera*, *Lysiloma*, *Simarouba*, *Krugiodendron*, *Ocotea*, *Piscidia*, *Swietenia*, *Sideroxylon*, *Exothea*, *Ficus*, *Coccoloba*, *Metopium*, *Conocarpus*, *Guapira*, and *Pisonia*; a subcanopy vegetated by *Eugenia*, *Thrinax*, *Amyris*, *Ardisia*, *Psychotria*, *Chrysophyllum*, *Sabal*, *Guaiacum*, *Ximenia*, and *Colubrina*; and an understory vegetated by *Zamia*, *Acanthocereus*, and *Oplismenus*.

(D) Buttonwood forest habitat contains:

(1) Open to semi-open canopy and understory;

(2) Substrate with calcareous marl muds, calcareous sands, or limestone rock; and

(3) A plant community of predominately native vegetation and either no competitive nonnative, invasive plant species or such species in quantities low enough to have minimal effect on survival of *Chromolaena frustrata*. Buttonwood forest has a canopy vegetated by *Conocarpus*, and an understory vegetated by *Borrchia*, *Lycium*, and *Limonium*.

(ii) A disturbance regime, due to the effects of strong winds or salt-water inundation from storm surge or infrequent tidal inundation, that creates canopy disruption in all habitats listed above in (1).

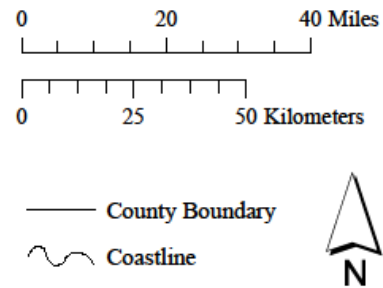
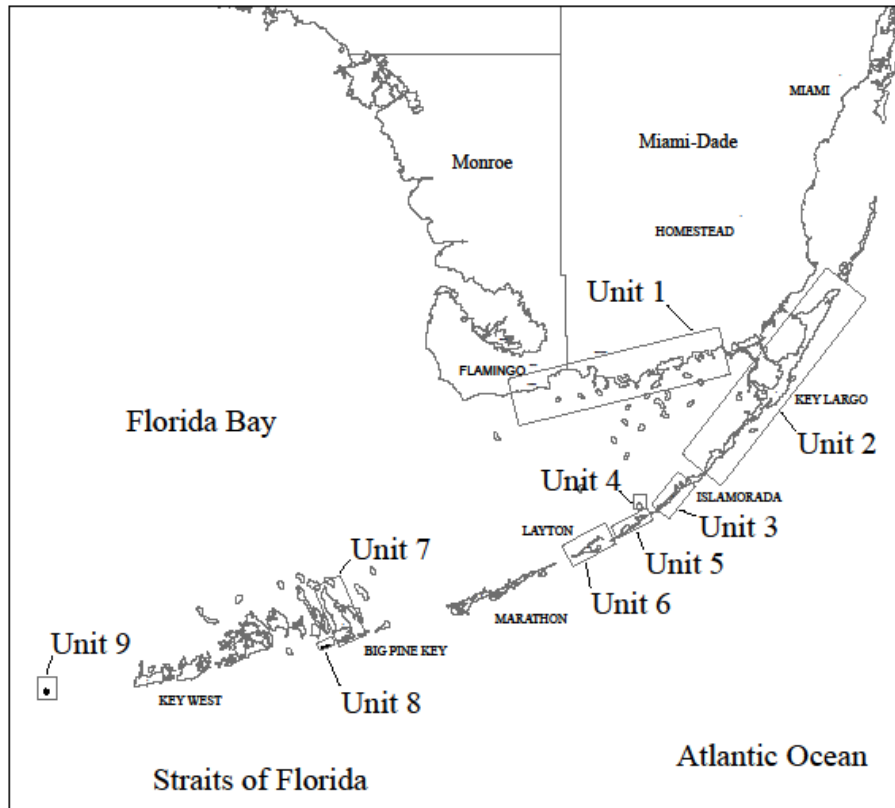
(iii) Habitats that are connected and of sufficient area to sustain viable populations in all habitats listed above in (1).

(3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located exists within the legal boundaries on the effective date of this rule.

(4) Critical habitat map units. Unit maps were developed using ESRI ArcGIS mapping software along with various spatial data layers. ArcGIS was also used to calculate. The projection used in mapping and calculating distances and locations within the units was North American Albers Equal Area Conic, NAD 83. The maps in this entry, as modified by any accompanying regulatory text, establish the boundaries of the critical habitat designation. The coordinates or plot points or both on which each map is based are available to the public at the Service's internet site, (<http://www.fws.gov/verobeach/>), the Federal eRulemaking Portal (<http://www.regulations.gov> at Docket No. FWS-R4-ES-2012-0076) and at the field office responsible for this designation. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2.

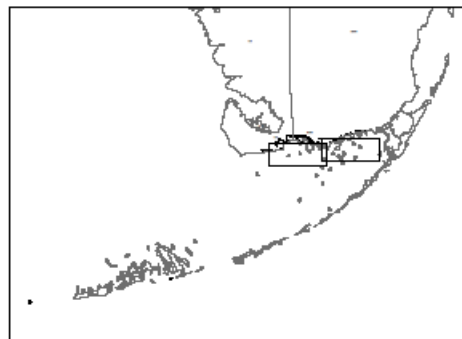
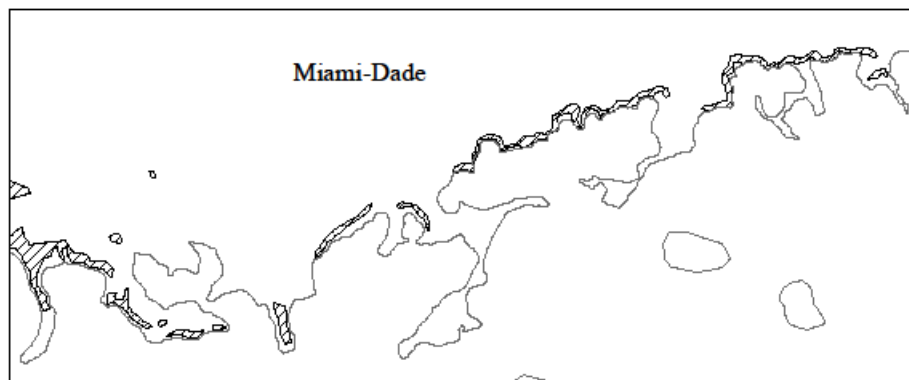
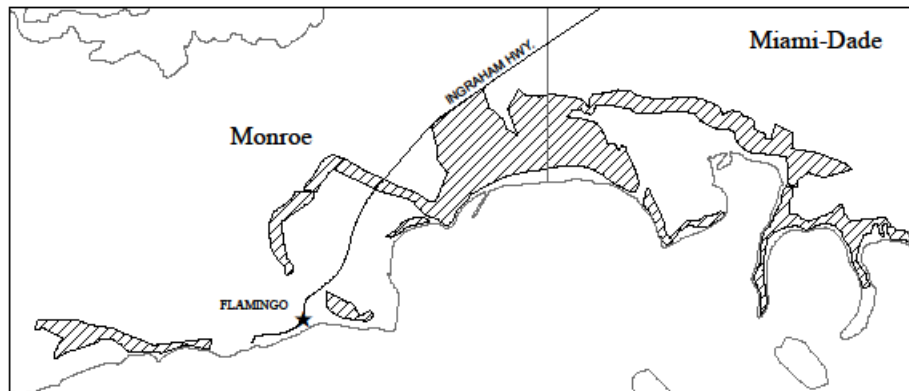
(5) Index map follows:

Index Map of All Critical Habitat Units for *Chromolaena frustrata*



(6) Unit 1: Everglades National Park, Monroe and Miami-Dade Counties,
Florida. Map of Unit 1 follows:

Map of Unit 1 of Critical Habitat for *Chromolaena frustrata*



0 1.25 2.5 5 Miles

0 1.25 2.5 5 Kilometers

— Highway

— Major Road

~ Coastline

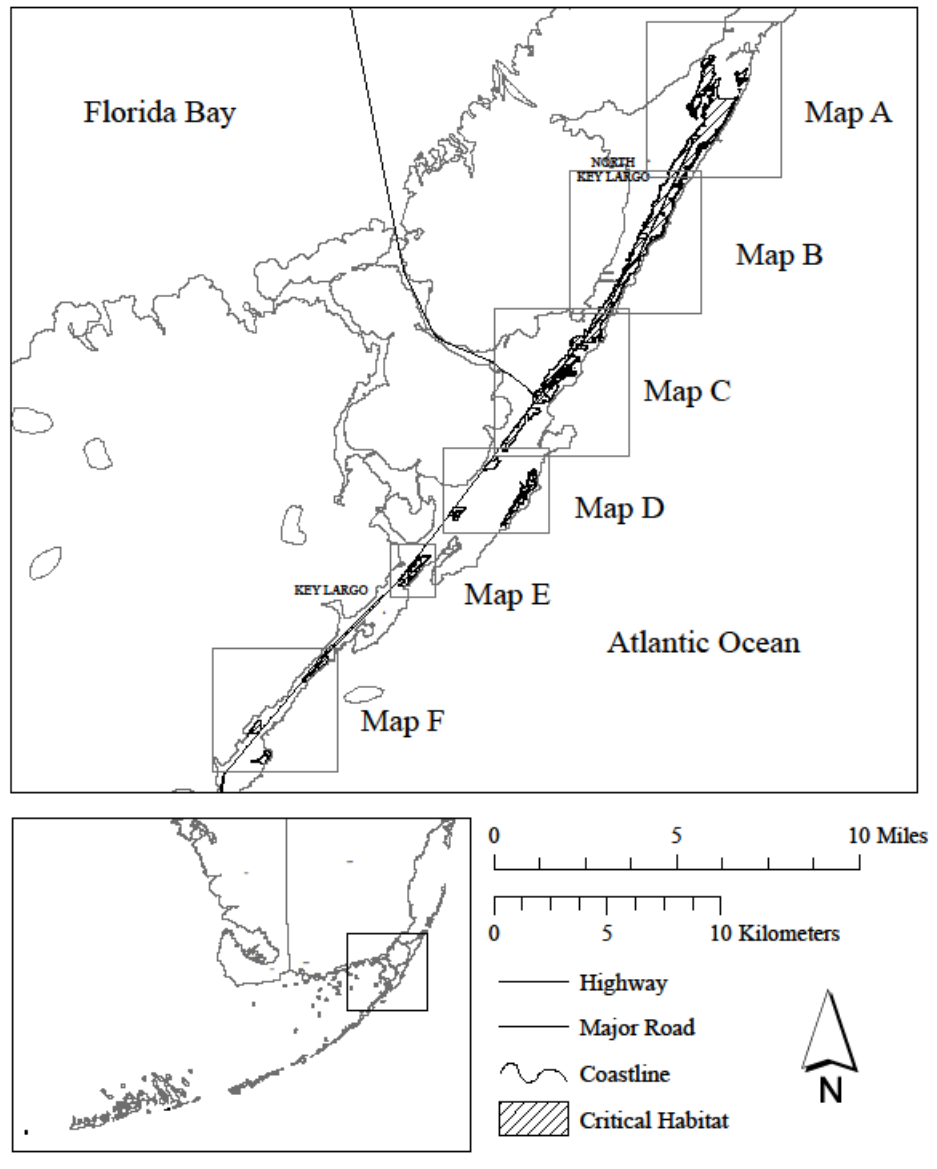
▨ Critical Habitat



(7) Unit 2: Key Largo, Monroe County, Florida. Index

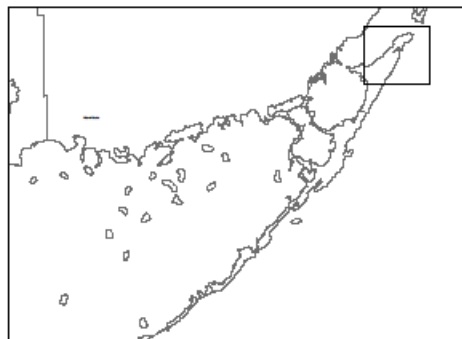
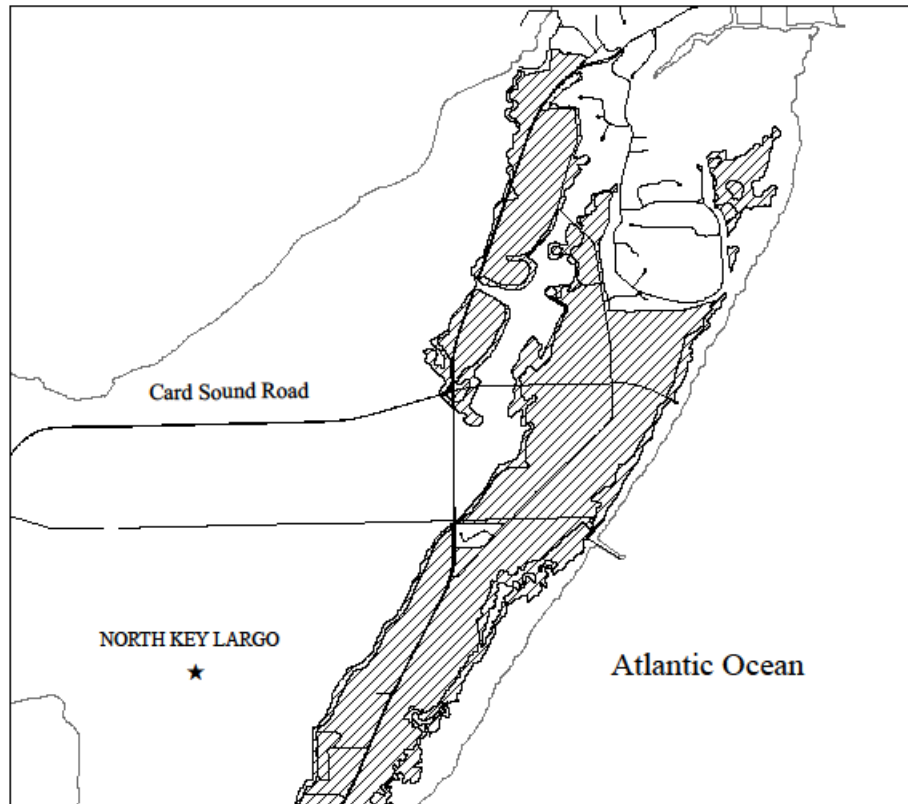
(i) Index map of Unit 2 follows:

Index Map of Unit 2 of Critical Habitat for *Chromolaena frustrata*



(ii) Map A of Unit 2 follows:

Map A of Unit 2 of Critical Habitat for *Chromolaena frustrata*



0 0.75 1.5 Miles

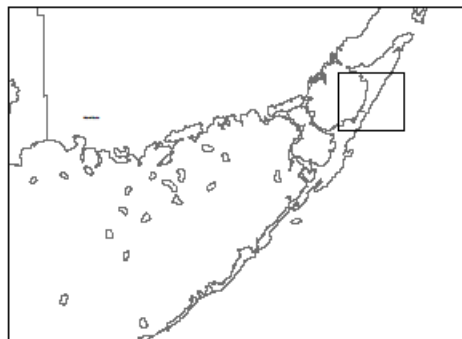
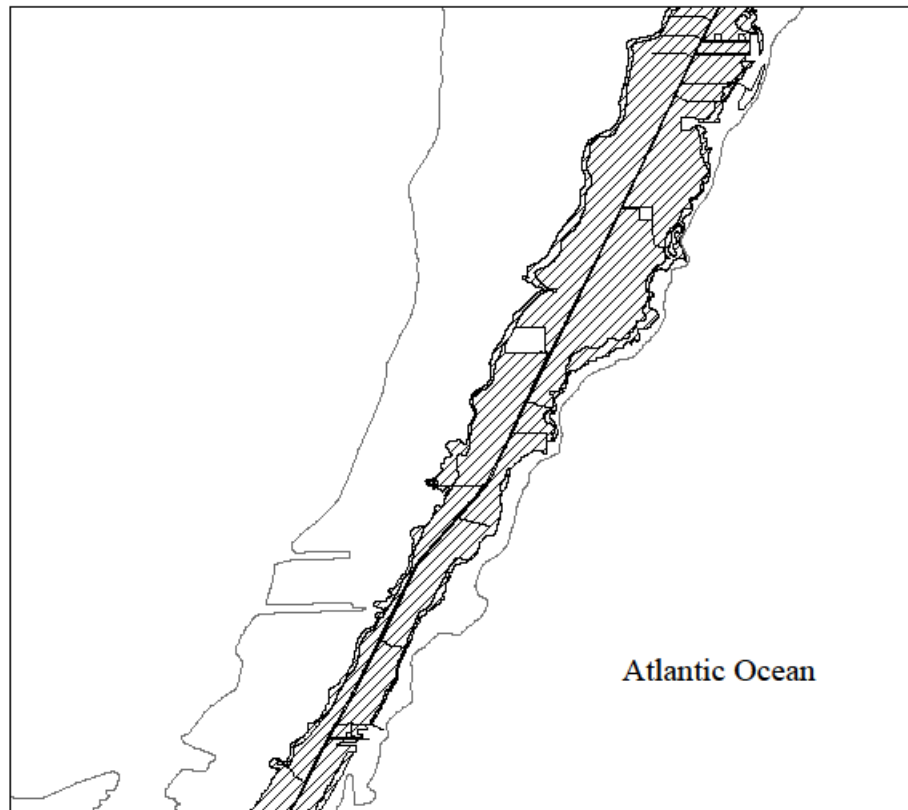
0 0.75 1.5 Kilometers

- Highway
- Major Road
- ~ Coastline
- ▨ Critical Habitat



(iii) Map B of Unit 2 follows:

Map B of Unit 2 of Critical Habitat for *Chromolaena frustrata*



0 0.75 1.5 Miles

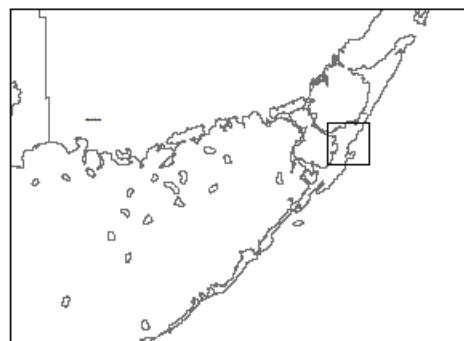
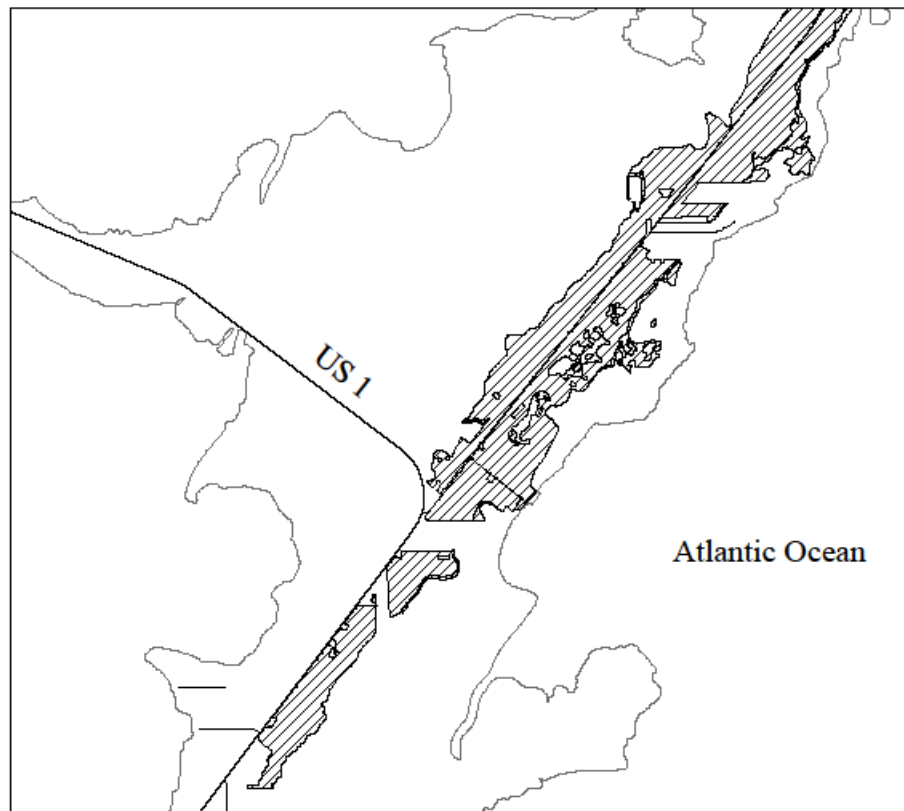
0 0.75 1.5 Kilometers

- Highway
- Major Road
- ~ Coastline
- ▨ Critical Habitat



(iv) Map C of Unit 2 follows:

Map C of Unit 2 of Critical Habitat for *Chromolaena frustrata*



0 0.75 1.5 Miles

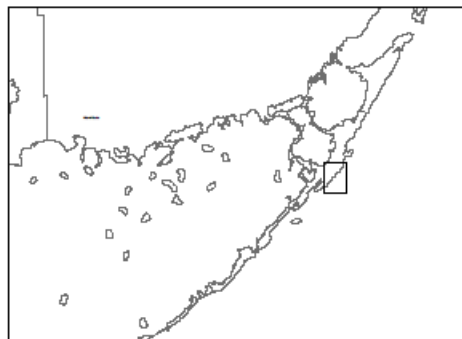
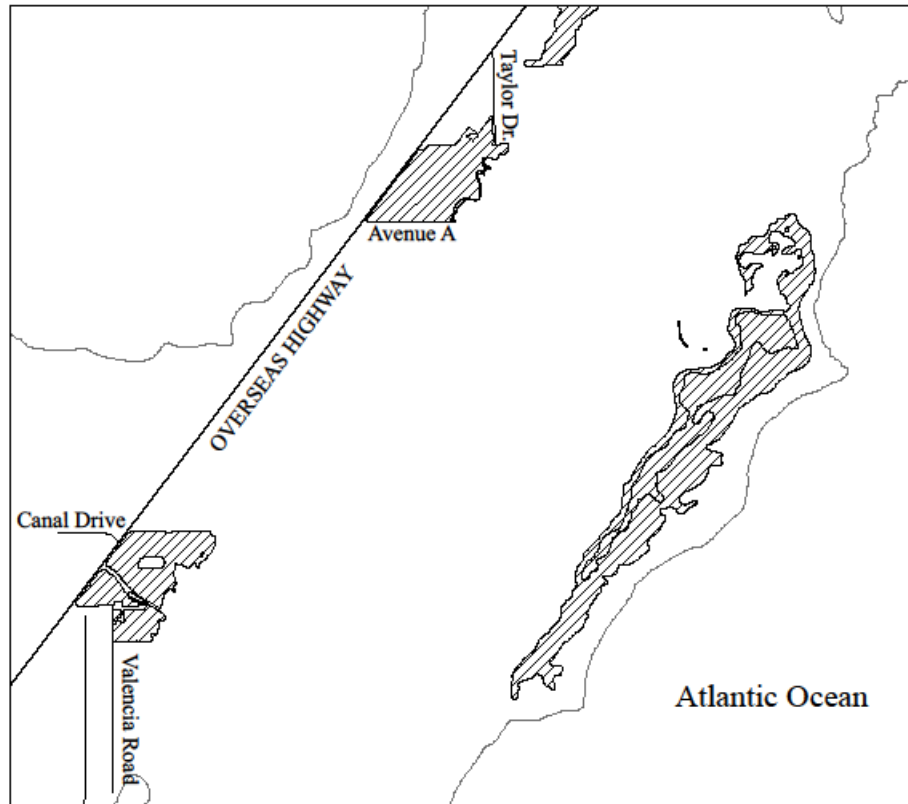
0 0.75 1.5 Kilometers

— Highway
— Major Road
~ Coastline
▨ Critical Habitat



(v) Map D of Unit 2 follows:

Map D of Unit 2 of Critical Habitat for *Chromolaena frustrata*



0 0.5 1 Miles

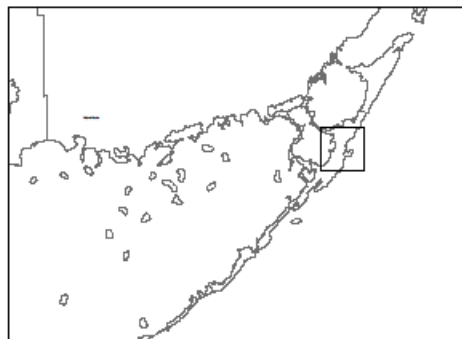
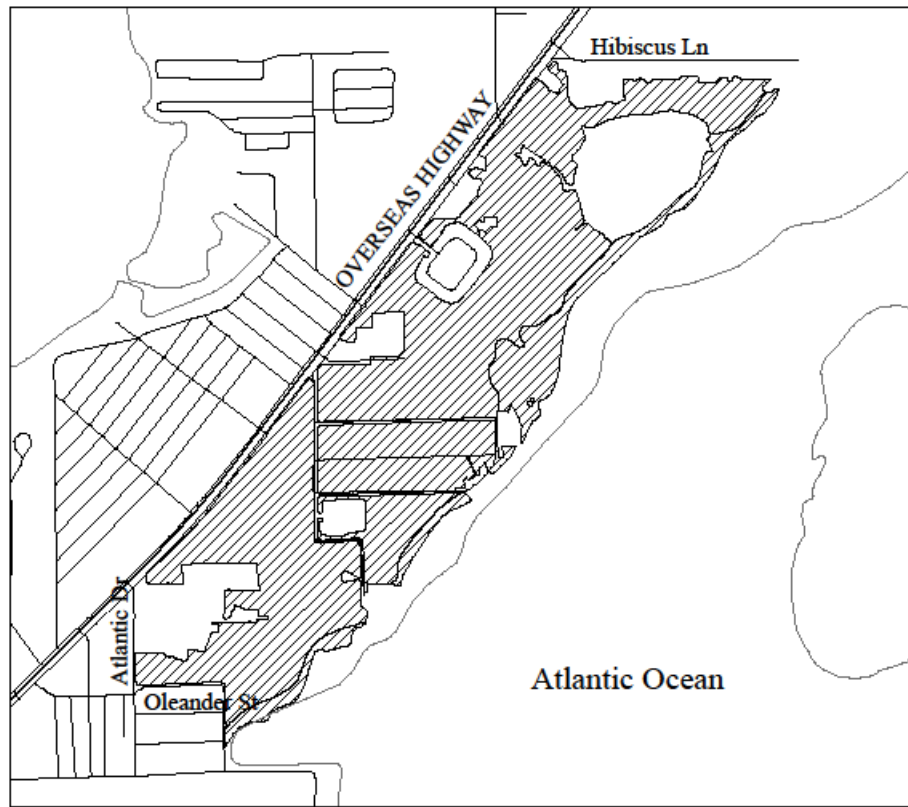
0 0.5 1 Kilometers

- Highway
- Major Road
- ~ Coastline
- ▨ Critical Habitat



(vi) Map E of Unit 2 follows:

Map E of Unit 2 of Critical Habitat for *Chromolaena frustrata*



0 0.2 0.4 Miles

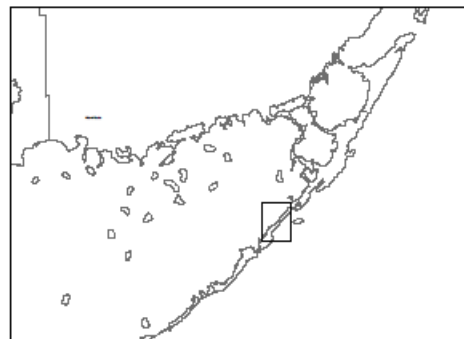
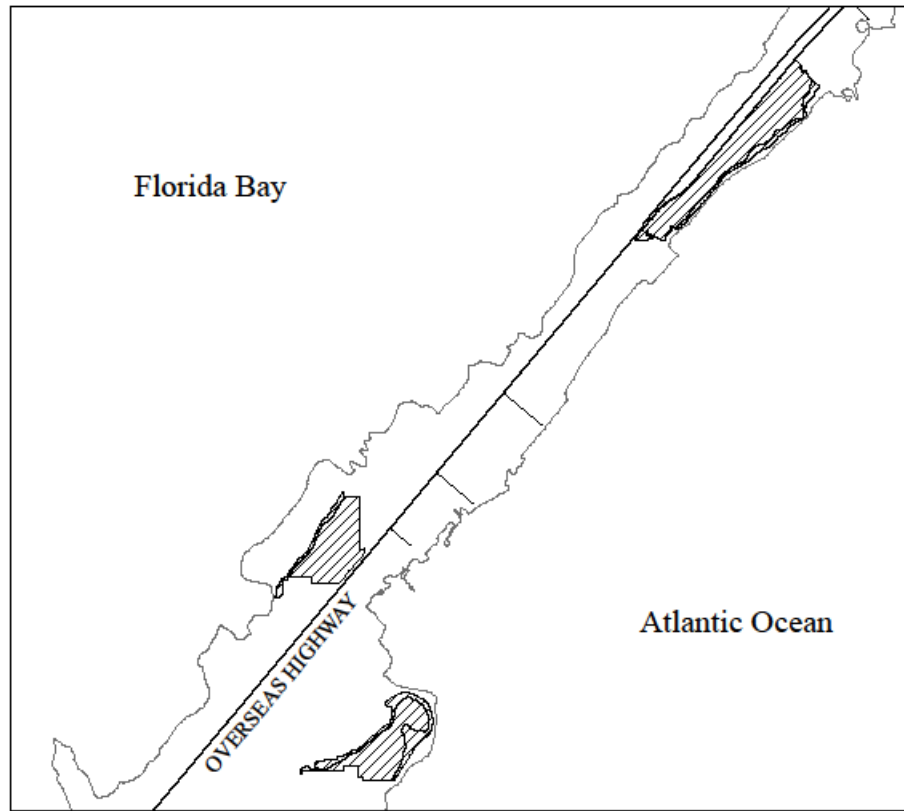
0 0.25 0.5 Kilometers

- Highway
- Major Road
- ~ Coastline
- ▨ Critical Habitat



(vii) Map F of Unit 2 follows:

Map F of Unit 2 of Critical Habitat for *Chromolaena frustrata*



0 0.5 1 Miles

0 0.5 1 Kilometers

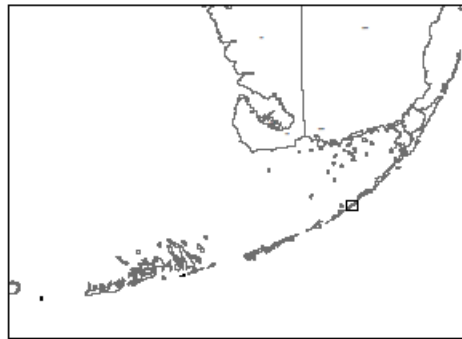
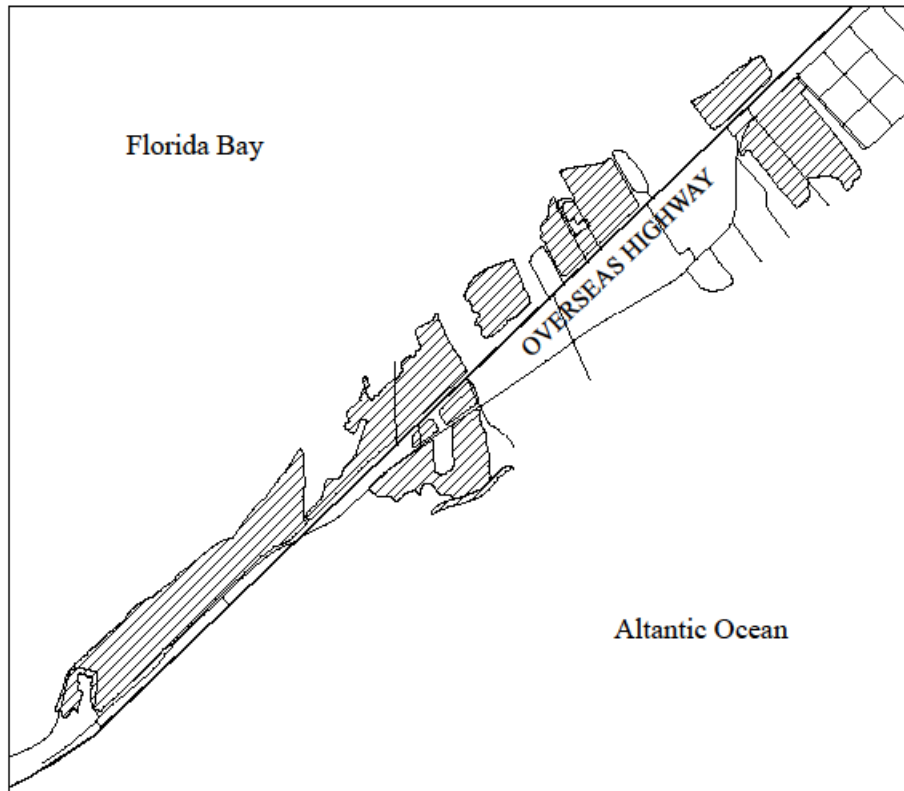
- Highway
- Major Road
- ~ Coastline
- ▨ Critical Habitat



(8) Unit 3: Upper Matecumbe Key, Monroe County, Florida. Map of Unit 3

follows:

Map of Unit 3 of Critical Habitat for *Chromolaena frustrata*




0 0.2 0.4 Miles

0 0.2 0.4 Kilometers

— Highway

— Major Road

~ Coastline

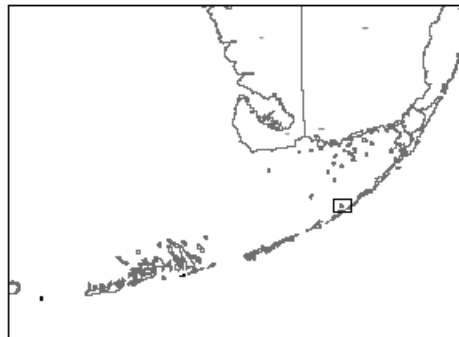
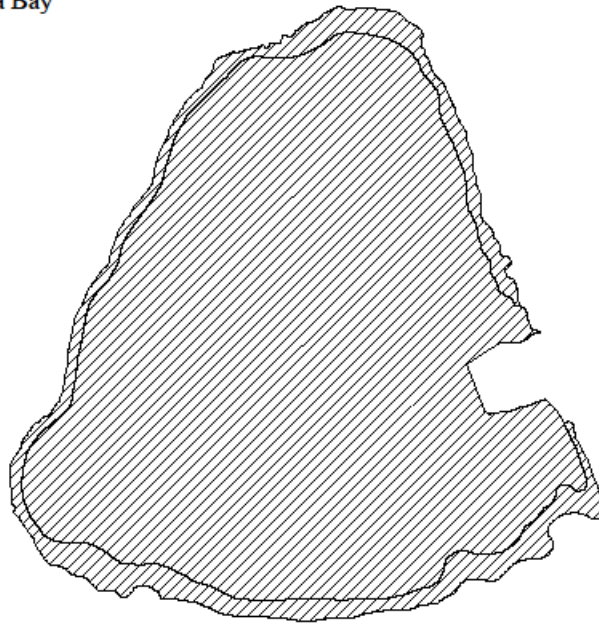
 Critical Habitat



(9) Unit 4: Lignumvitae Key, Monroe County, Florida. Map of Unit 4 follows:

Map of Unit 4 of Critical Habitat for *Chromolaena frustrata*

Florida Bay




0 0.15 0.3 Miles

0 0.1 0.2 Kilometers

— Highway

— Major Road

~ Coastline

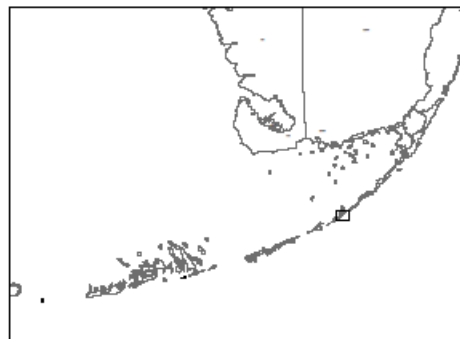
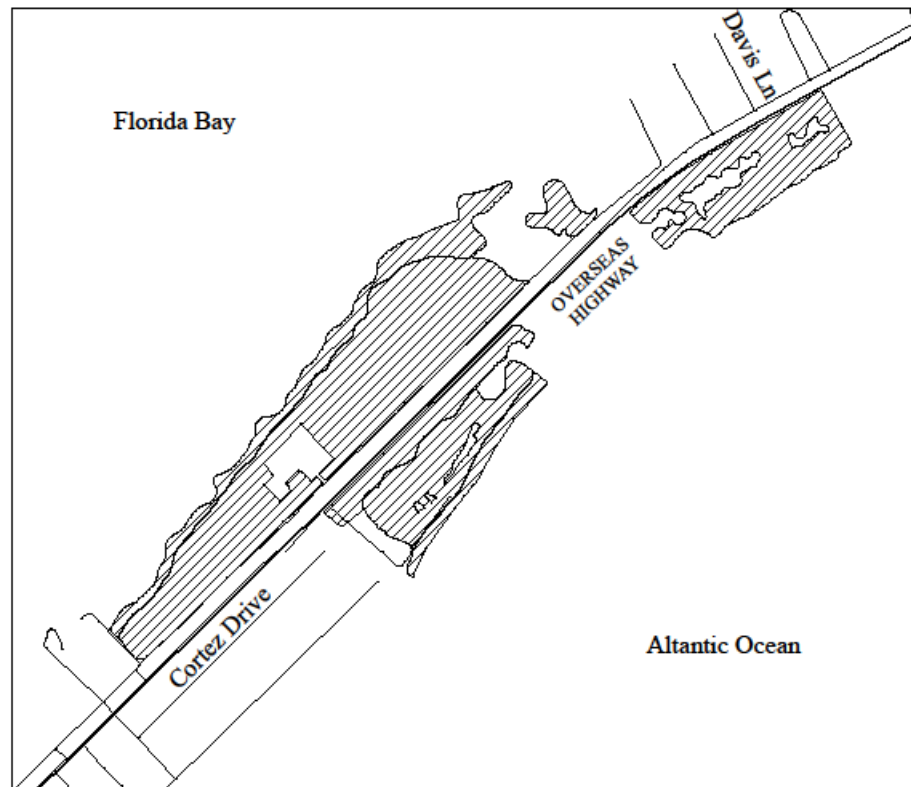
 Critical Habitat



(10) Unit 5: Lower Matecumbe Key, Monroe County, Florida. Map of Unit 5

follows:

Map of Unit 5 of Critical Habitat for *Chromolaena frustrata*



0 0.15 0.3 Miles

0 0.15 0.3 Kilometers

— Highway

— Major Road

~ Coastline

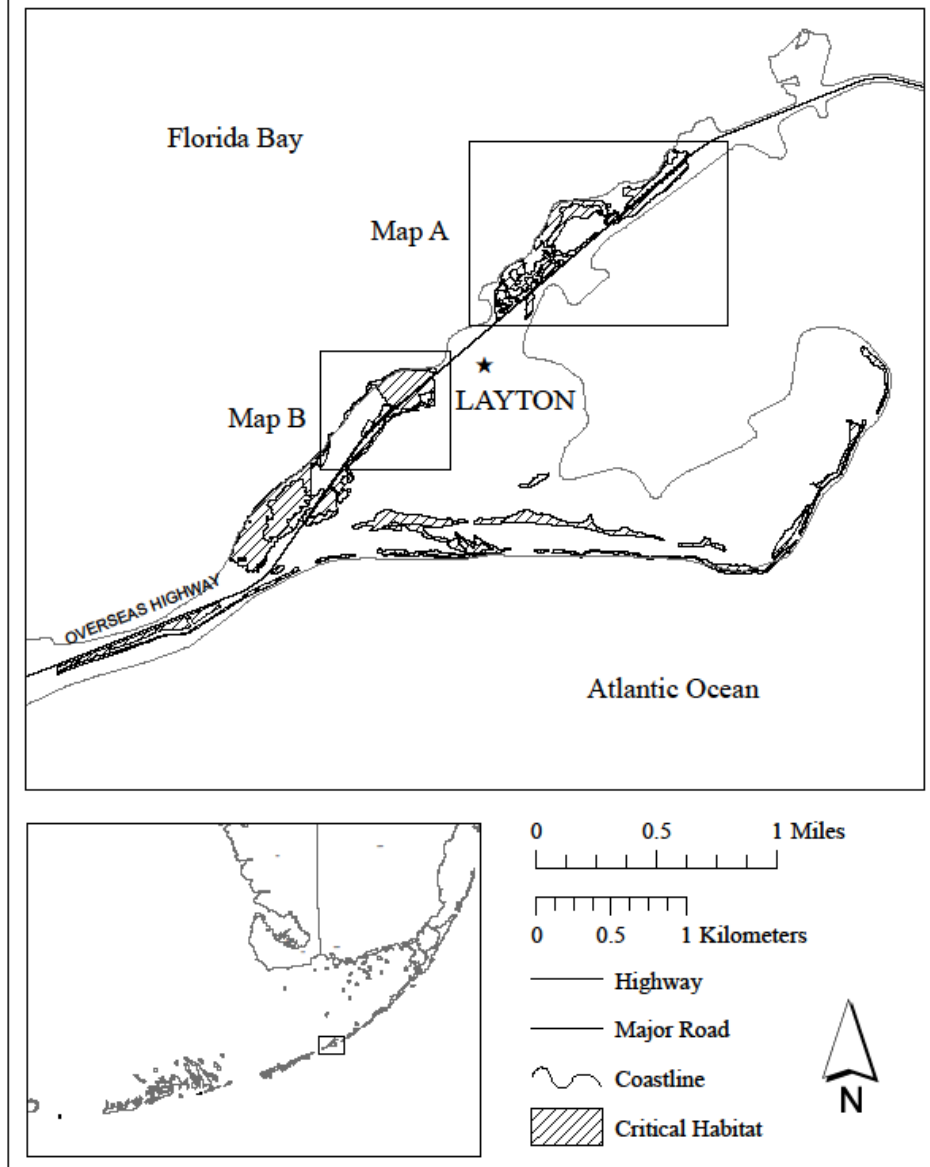
▨ Critical Habitat



(11) Unit 6: Long Key, Monroe County, Florida.

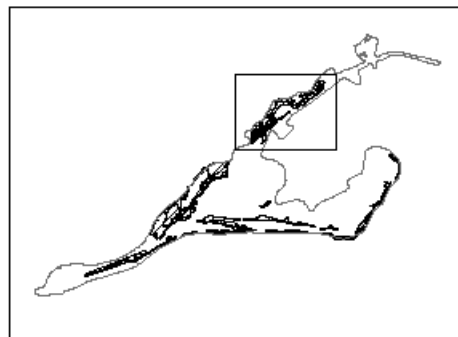
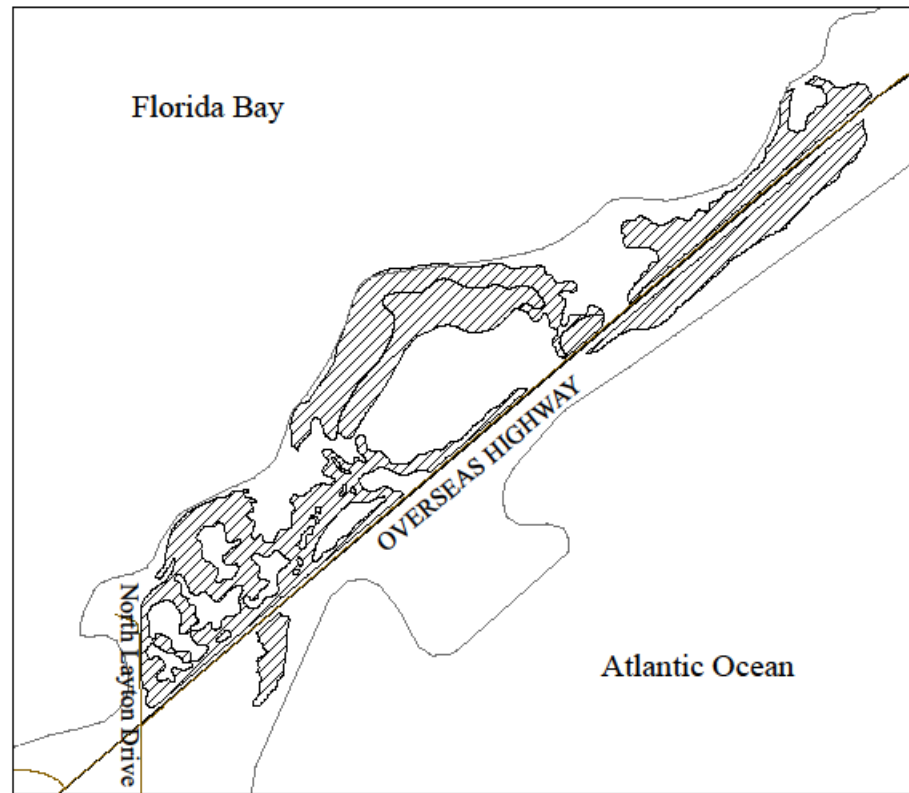
(i) Index map of Unit 6 follows:

Index Map of Unit 6 of Critical Habitat for *Chromolaena frustrata*

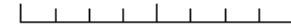


(ii) Map A of Unit 6 follows:

Map A of Unit 6 of Critical Habitat for *Chromolaena frustrata*



0 0.15 0.3 Miles



0 0.15 0.3 Kilometers

— Highway

— Major Road

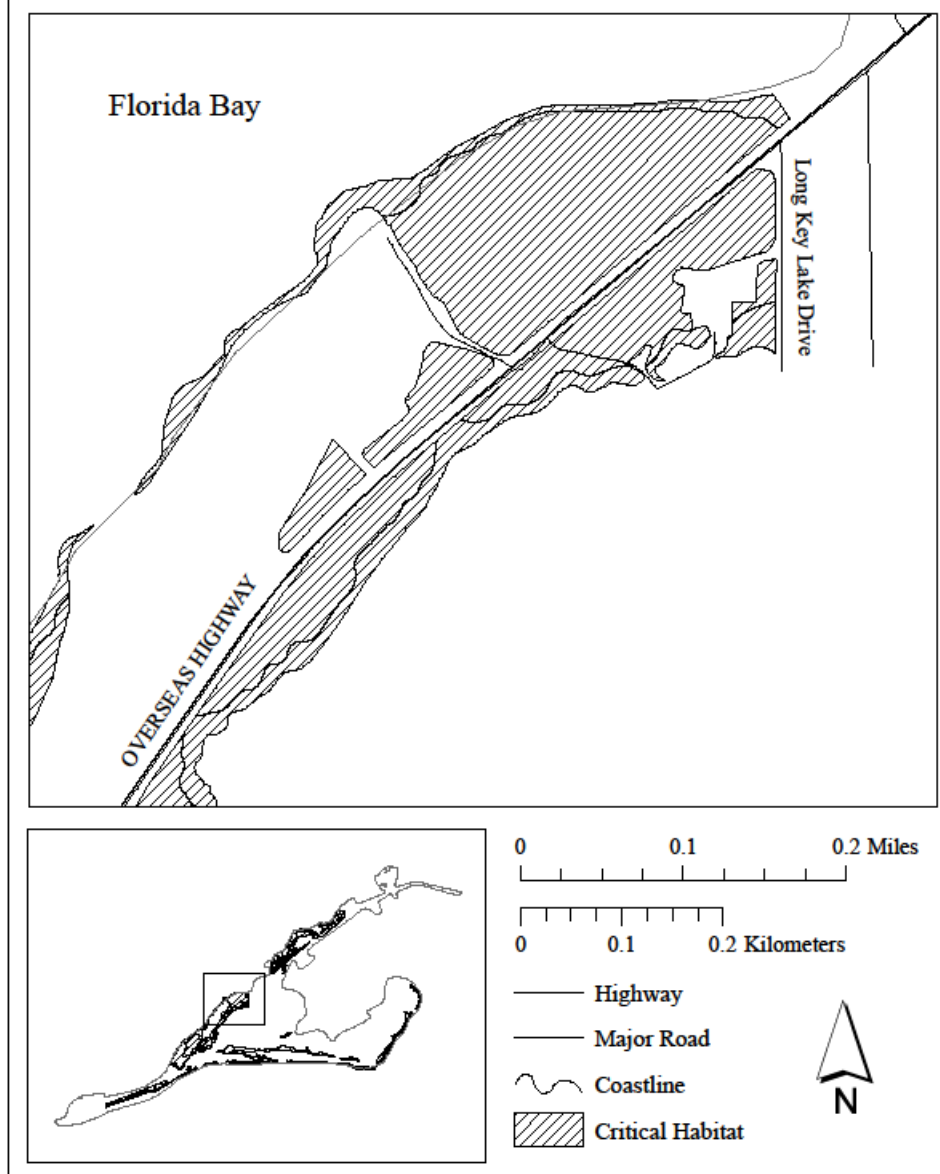
~ Coastline

▨ Critical Habitat



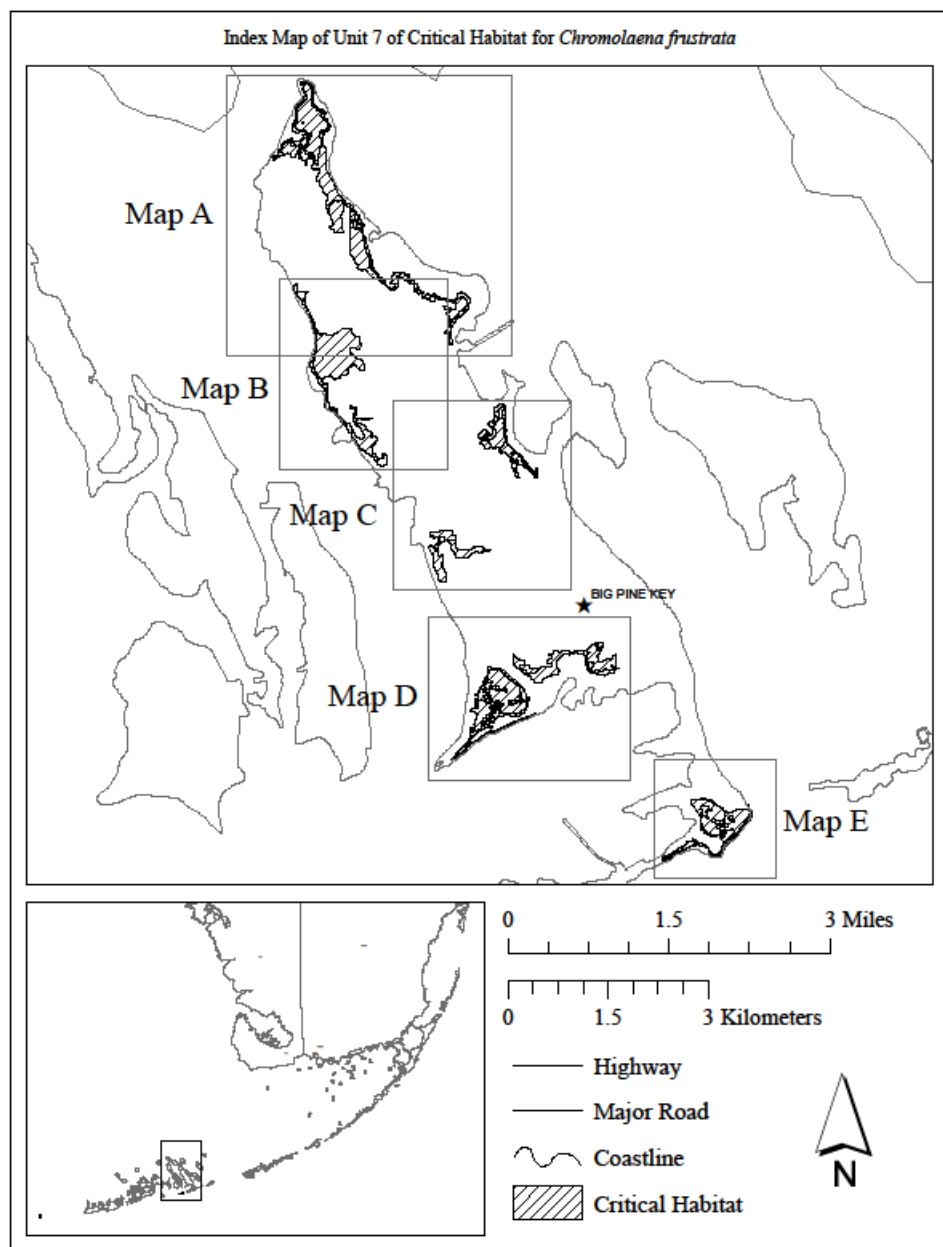
(iii) Map B of Unit 6 follows:

Map B of Unit 6 of Critical Habitat for *Chromolaena frustrata*



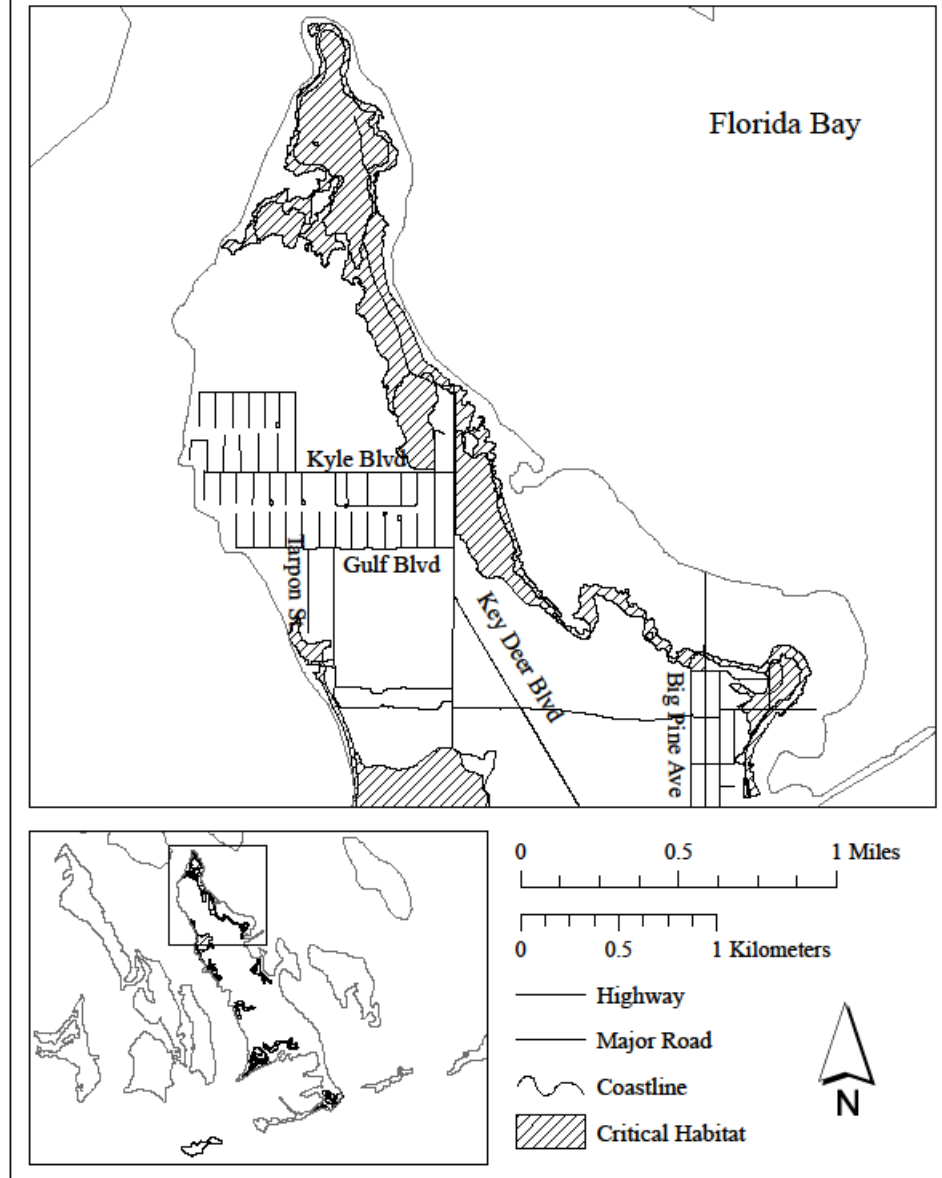
(12) Unit 7: Big Pine Key, Monroe County, Florida.

(i) Index map of Unit 7 follows:



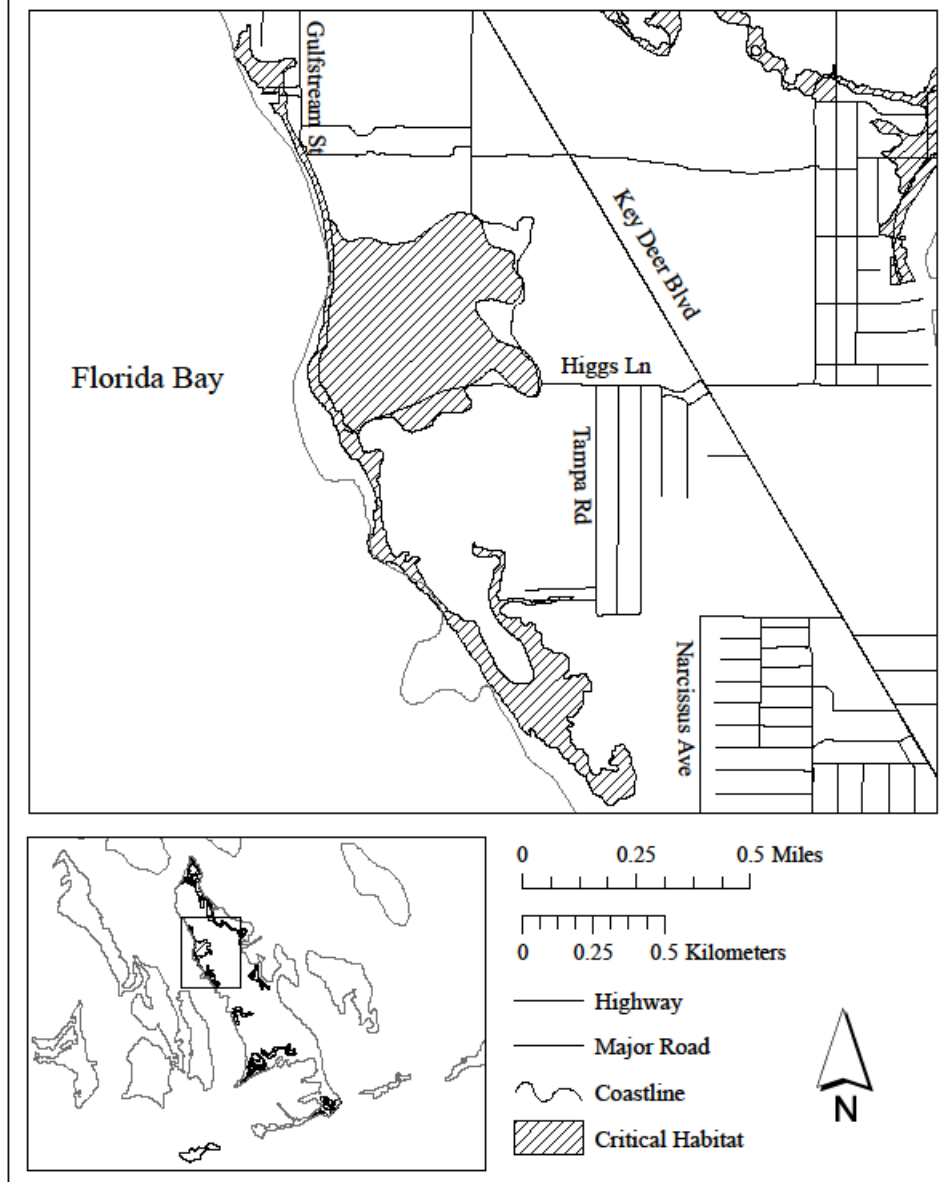
(ii) Map A of Unit 7 follows:

Map A of Unit 7 of Critical Habitat for *Chromolaena frustrata*



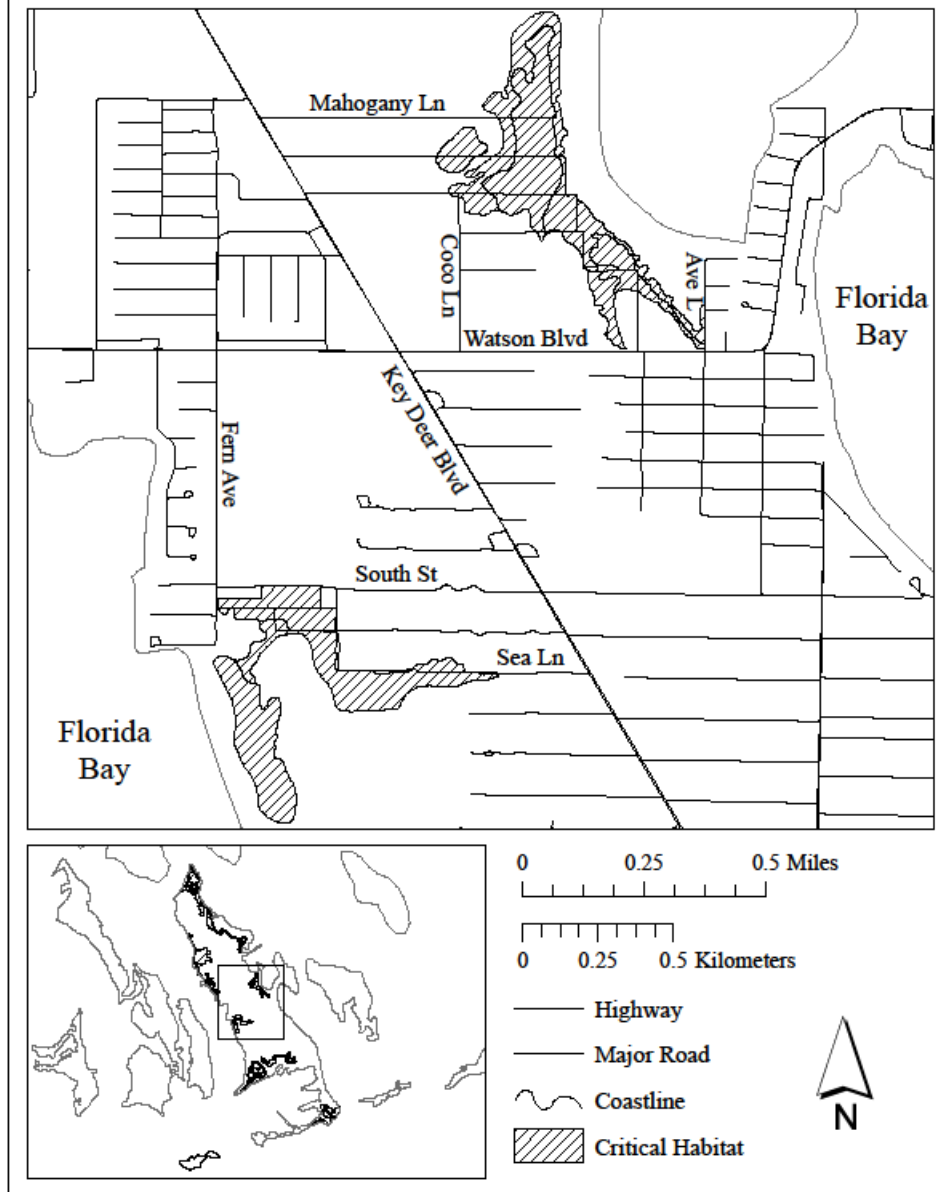
(iii) Map B of Unit 7 follows:

Map B of Unit 7 of Critical Habitat for *Chromolaena frustrata*



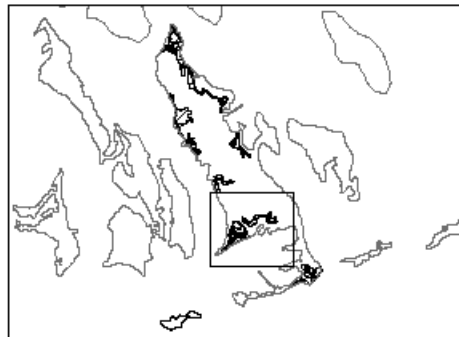
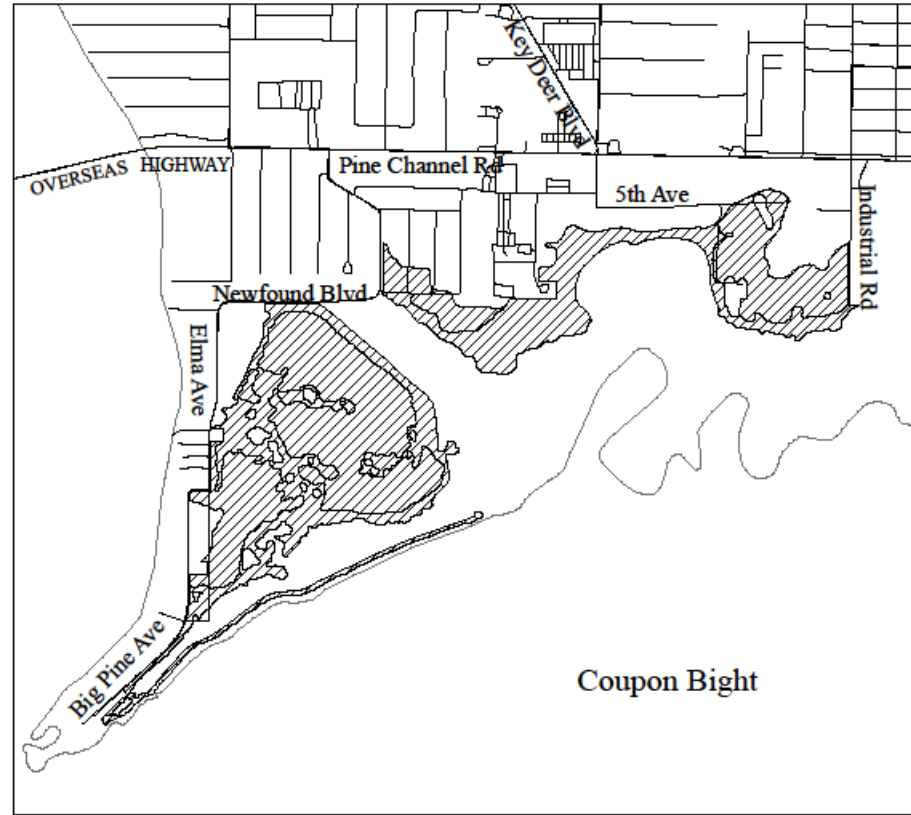
(iv) Map C of Unit 7 follows:

Map C of Unit 7 of Critical Habitat for *Chromolaena frustrata*



(v) Map D of Unit 7 follows:

Map D of Unit 7 of Critical Habitat for *Chromolaena frustrata*



0 0.25 0.5 Miles

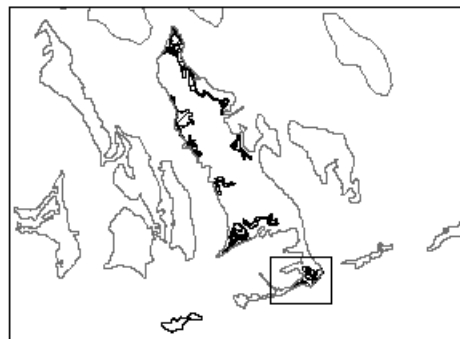
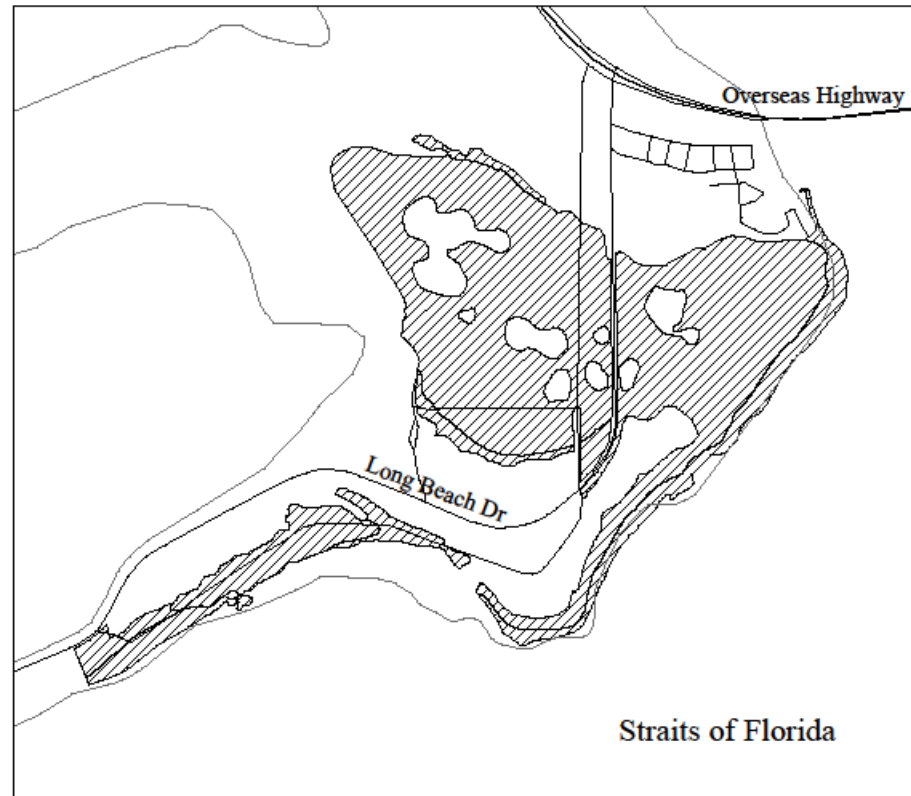
0 0.25 0.5 Kilometers

- Highway
- Major Road
- ~ Coastline
- ▨ Critical Habitat



(vi) Map E of Unit 7 follows:

Map E of Unit 7 of Critical Habitat for *Chromolaena frustrata*



0 0.15 0.3 Miles

0 0.15 0.3 Kilometers

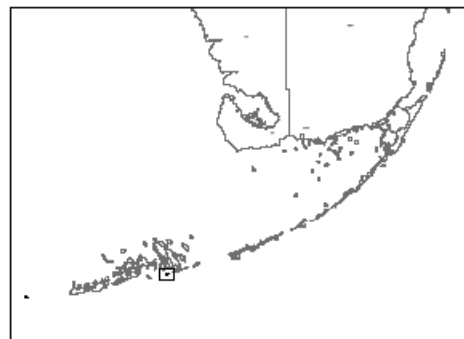
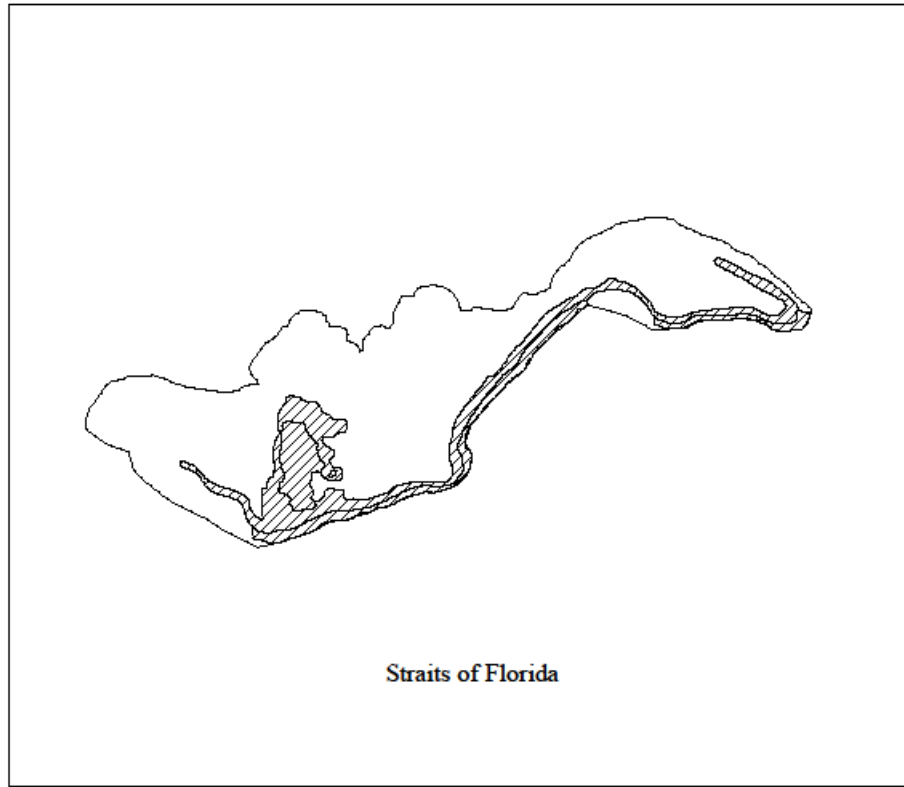
- Highway
- Major Road
- ~ Coastline
- ▨ Critical Habitat



(13) Unit 8: Big Munson Island, Monroe County, Florida. Map of Unit 8

follows:

Map of Unit 8 of Critical Habitat for *Chromolaena frustrata*



0 0.1 0.2 0.4 Miles




0 0.1 0.2 0.4 Kilometers

— Highway

— Major Road

~ Coastline

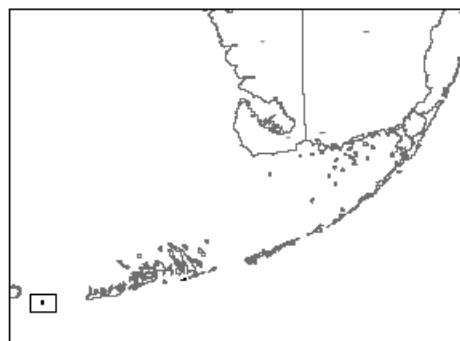
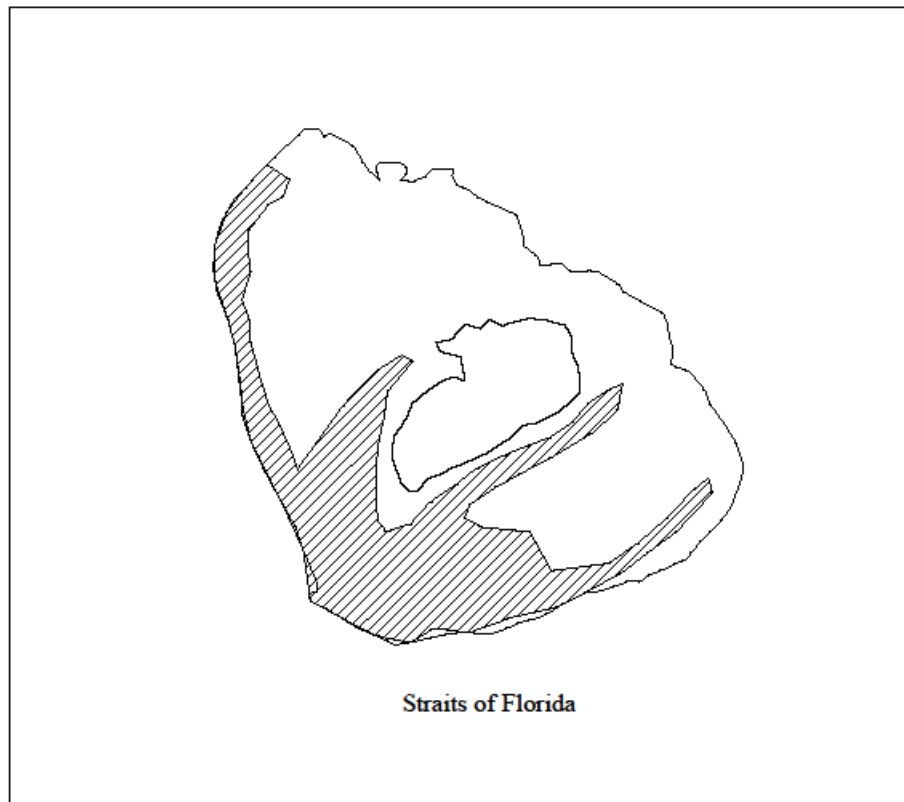
 Critical Habitat



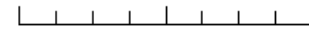
(14) Unit 9: Boca Grande Key, Monroe County, Florida. Map of Unit 9

follows:

Map of Unit 9 of Critical Habitat for *Chromolaena frustrata*



0 0.1 0.2 0.4 Miles



0 0.1 0.2 0.4 Kilometers

— Highway

— Major Road

~ Coastline

▨ Critical Habitat



* * * * *

Dated: September 25, 2012

/s/ Rachel Jacobson

Principal Deputy Assistant Secretary for Fish and Wildlife and Parks

**~~Endangered and Threatened Wildlife and Plants; Endangered Status for Cape
Sable Thoroughwort, *Consolea corallicola* Florida Semaphore Cactus, and
Aboriginal Prickly apple, and Designation of Critical Habitat for Cape Sable
Thoroughwort~~**

Billing Code 4310-55-P

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